

CALIBRATION SHEETS

SBE 37SMP Configuration - S/N 5295.....	1
SBE 37SMP Pressure Test Certificate - S/N 5295.....	2
SBE 37SMP Temperature Calibration - S/N 5295.....	3
SBE 37SMP Conductivity Calibration - S/N 5295.....	4
SBE 37SMP Real Time Clock Calibration - S/N 5295.....	5
SBE 37SMP Pressure Calibration - S/N 5295.....	6
SBE 37SMP Configuration - S/N 5296.....	7
SBE 37SMP Pressure Test Certificate - S/N 5296.....	8
SBE 37SMP Temperature Calibration - S/N 5296.....	9
SBE 37SMP Conductivity Calibration - S/N 5296.....	10
SBE 37SMP Real Time Clock Calibration - S/N 5296.....	11
SBE 37SMP Pressure Calibration - S/N 5296.....	12
SBE 37SMP Configuration - S/N 5297.....	13
SBE 37SMP Pressure Test Certificate - S/N 5297.....	14
SBE 37SMP Temperature Calibration - S/N 5297.....	15
SBE 37SMP Conductivity Calibration - S/N 5297.....	16

CALIBRATION SHEETS

SBE 37SMP Real Time Clock Calibration - S/N 5297.....	17
SBE 37SMP Pressure Calibration - S/N 5297.....	18
SBE 37SMP Configuration - S/N 5298.....	19
SBE 37SMP Pressure Test Certificate - S/N 5298.....	20
SBE 37SMP Temperature Calibration - S/N 5298.....	21
SBE 37SMP Conductivity Calibration - S/N 5298.....	22
SBE 37SMP Real Time Clock Calibration - S/N 5298.....	23
SBE 37SMP Pressure Calibration - S/N 5298.....	24
SBE 37SMP Configuration - S/N 5299.....	25
SBE 37SMP Pressure Test Certificate - S/N 5299.....	26
SBE 37SMP Temperature Calibration - S/N 5299.....	27
SBE 37SMP Conductivity Calibration - S/N 5299.....	28
SBE 37SMP Real Time Clock Calibration - S/N 5299.....	29
SBE 37SMP Pressure Calibration - S/N 5299.....	30
SBE 37SMP Configuration - S/N 5300.....	31
SBE 37SMP Pressure Test Certificate - S/N 5300.....	32

CALIBRATION SHEETS

SBE 37SMP Temperature Calibration - S/N 5300.....	33
SBE 37SMP Conductivity Calibration - S/N 5300.....	34
SBE 37SMP Real Time Clock Calibration - S/N 5300.....	35
SBE 37SMP Pressure Calibration - S/N 5300.....	36
SBE 37SMP Configuration - S/N 5301.....	37
SBE 37SMP Pressure Test Certificate - S/N 5301.....	38
SBE 37SMP Temperature Calibration - S/N 5301.....	39
SBE 37SMP Conductivity Calibration - S/N 5301.....	40
SBE 37SMP Real Time Clock Calibration - S/N 5301.....	41
SBE 37SMP Pressure Calibration - S/N 5301.....	42
SBE 37SMP Configuration - S/N 5302.....	43
SBE 37SMP Pressure Test Certificate - S/N 5302.....	44
SBE 37SMP Temperature Calibration - S/N 5302.....	45
SBE 37SMP Conductivity Calibration - S/N 5302.....	46
SBE 37SMP Real Time Clock Calibration - S/N 5302.....	47
SBE 37SMP Pressure Calibration - S/N 5302.....	48

SBE37-SMP MicroCAT

*Conductivity & Temperature Recorder
with RS-232 Serial Interface*

Instrument Configuration:

Serial Number	37SMP45526-5295
Pressure Sensor	2000 dBar Druck, SN 2360962
Firmware Version	2.6b
Memory	2048Kb
Interface Type	RS-232
Conductivity Range	0-7 S/m
Pump Sample Rate	0.5 sec
Baud Rate	9600, 8 data bits, no parity
Maximum Depth	2000m

CAUTION - The maximum deployment depth will be limited by the measurement range of the optional pressure sensor, if installed.



Sea-Bird Electronics, Inc.

1808 136th Place NE, Bellevue, Washington 98005 USA

Website: <http://www.seabird.com>

Phone: (425) 643-9866

FAX: (425) 643-9954

Email: seabird@seabird.com

SBE Pressure Test Certificate

Test Date: 2/1/2007 Description SBE-37 Microcat

Job Number: 45526 Customer Name Woods Hole Group

SBE Sensor Information:

Model Number: 37

Serial Number: 5295

Pressure Sensor Information:

Sensor Type: Druck

Sensor Serial Number: 2360962

Sensor Rating: 2900

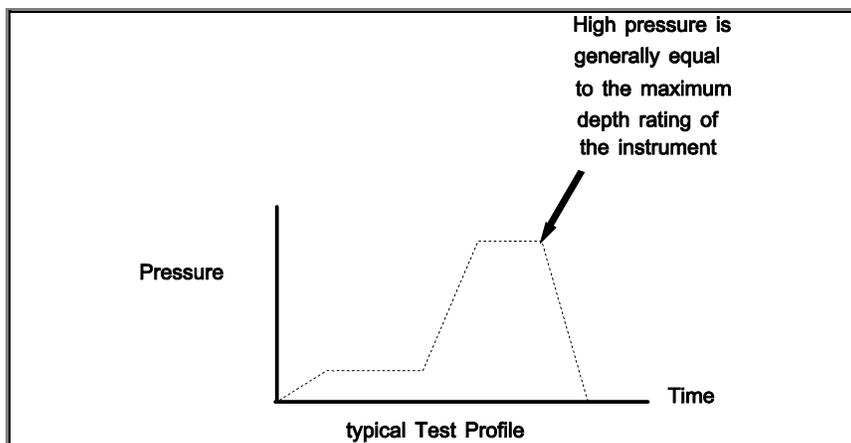
Pressure Test Protocol:

Low Pressure Test: 50 PSI Held For 15 Minutes

High Pressure Test: 2900 PSI Held For 15 Minutes

Passed Test:

Tested By: PCC



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5295
CALIBRATION DATE: 04-Feb-07

SBE 37 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

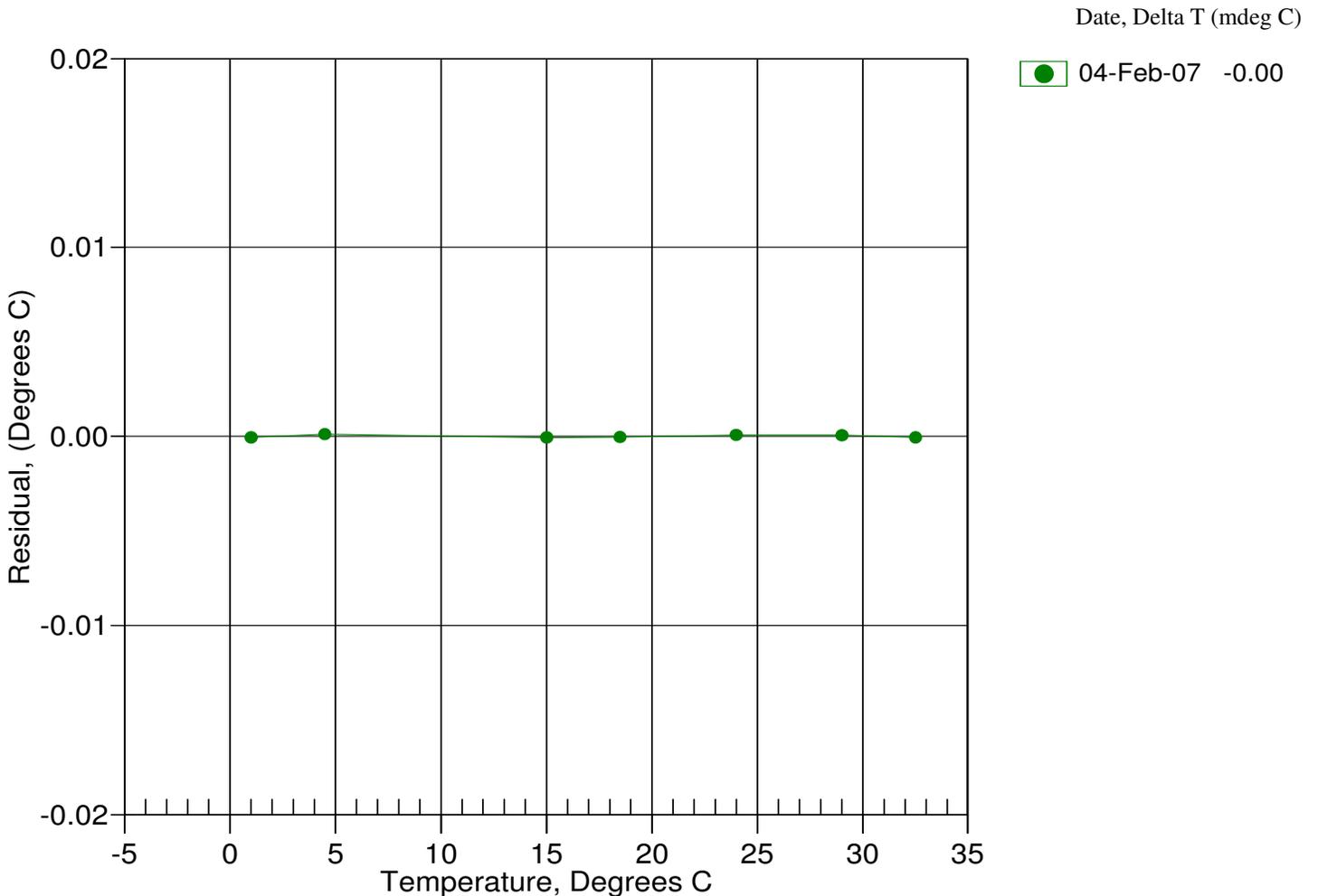
ITS-90 COEFFICIENTS

a0 = -6.802586e-005
a1 = 2.865741e-004
a2 = -3.144110e-006
a3 = 1.737165e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
0.9999	711255.5	0.9998	-0.0001
4.5000	608872.0	4.5001	0.0001
15.0000	389406.1	14.9999	-0.0001
18.5000	337558.4	18.4999	-0.0001
24.0000	271255.1	24.0001	0.0001
29.0000	223687.5	29.0001	0.0001
32.5000	196086.2	32.4999	-0.0001

Temperature ITS-90 = $1 / \{ a_0 + a_1[\ln(n)] + a_2[\ln^2(n)] + a_3[\ln^3(n)] \} - 273.15$ (°C)

Residual = instrument temperature - bath temperature



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5295
CALIBRATION DATE: 04-Feb-07

SBE 37 CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

g = -1.015187e+000	CPcor = -9.5700e-008
h = 1.576215e-001	CTcor = 3.2500e-006
i = -1.131794e-004	WBOTC = 1.9311e-005
j = 3.603816e-005	

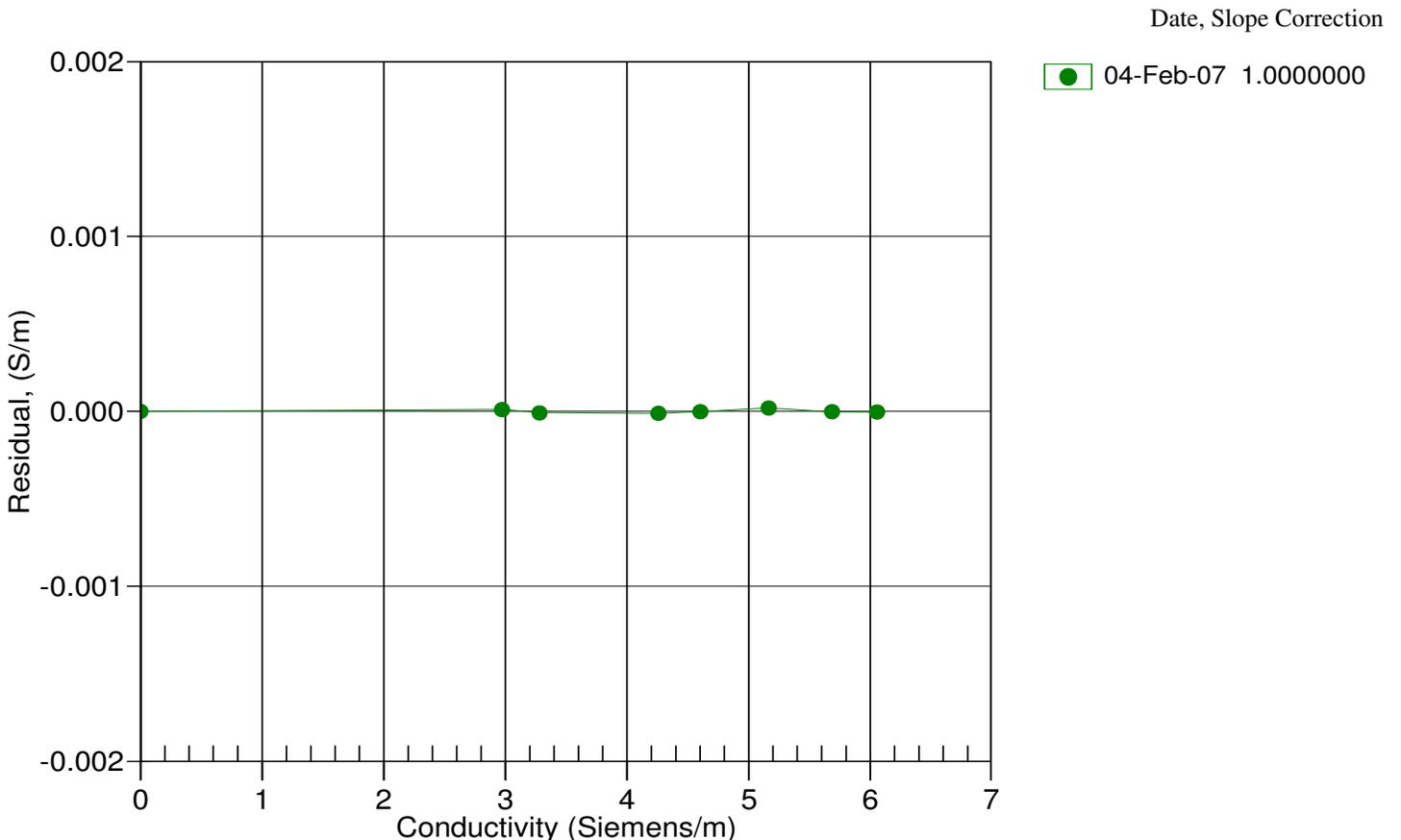
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2537.75	0.00000	0.00000
0.9999	34.7766	2.97289	5024.60	2.97290	0.00001
4.5000	34.7571	3.27969	5213.33	3.27968	-0.00001
15.0000	34.7151	4.26051	5774.62	4.26050	-0.00001
18.5000	34.7064	4.60536	5959.12	4.60536	-0.00000
24.0000	34.6971	5.16285	6245.55	5.16287	0.00002
29.0000	34.6924	5.68431	6501.68	5.68430	-0.00000
32.5000	34.6901	6.05647	6678.29	6.05646	-0.00000

$$f = \text{INST FREQ} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$$

$$\text{Conductivity} = (g + hf^2 + if^3 + jf^4) / (1 + \delta t + \epsilon p) \text{ Siemens/meter}$$

$$t = \text{temperature}[^{\circ}\text{C}]; p = \text{pressure}[\text{decibars}]; \delta = \text{CTcor}; \epsilon = \text{CPcor};$$

$$\text{Residual} = \text{instrument conductivity} - \text{bath conductivity}$$



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5295
CALIBRATION DATE: 04-Feb-07

SBE 37 RTC CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

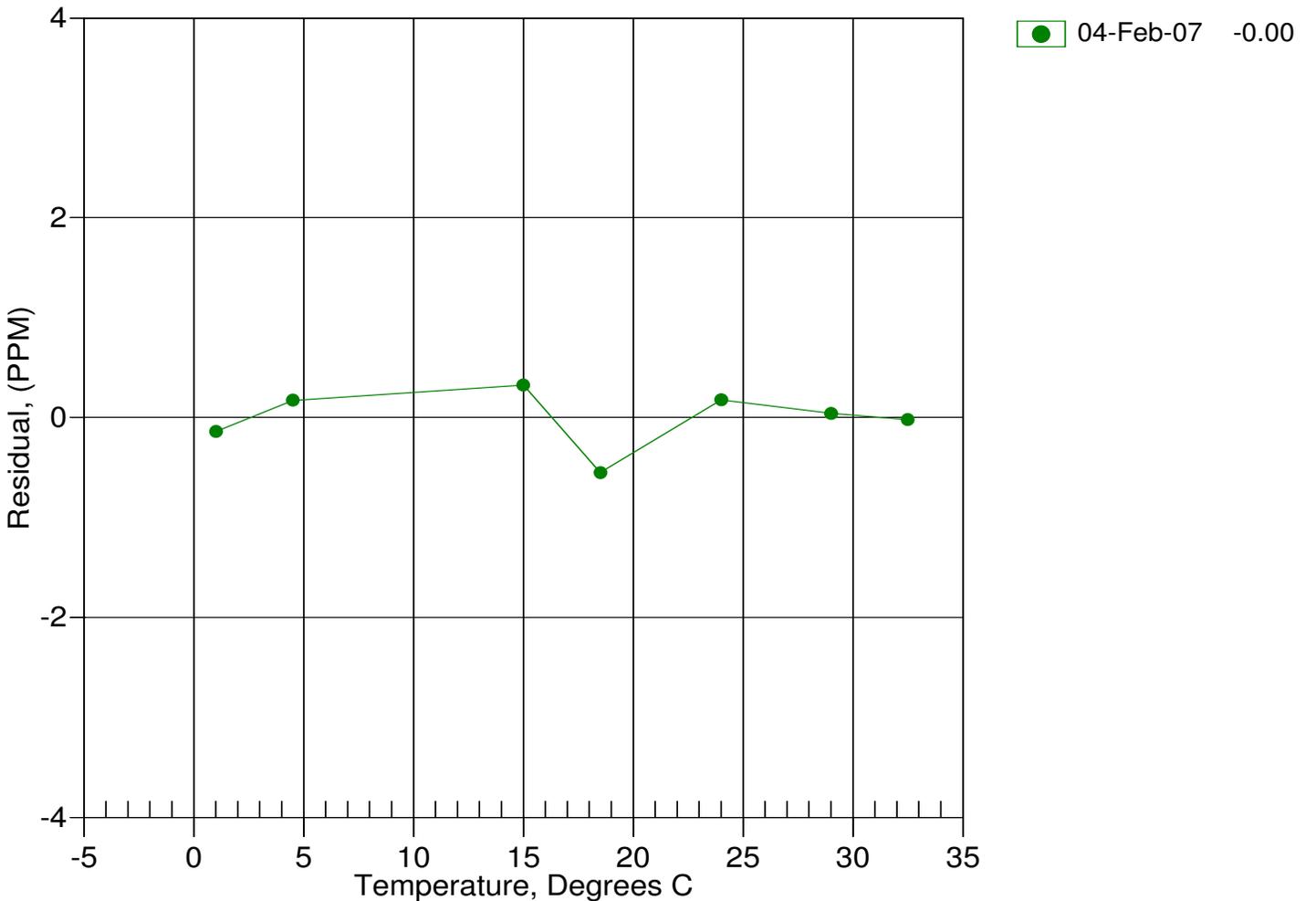
rtca0 = 9.999732e-001
rtca1 = 1.696452e-006
rtca2 = -3.252386e-008

BATH TEMP (ITS-90)	RTC FREQ (Hz)	COMPUTED FREQ (Hz)	RESIDUAL (PPM)
0.9999	0.9999750	0.9999749	-0.1
4.5000	0.9999800	0.9999802	0.2
15.0000	0.9999910	0.9999913	0.3
18.5000	0.9999940	0.9999934	-0.6
24.0000	0.9999950	0.9999952	0.2
29.0000	0.9999950	0.9999950	0.0
32.5000	0.9999940	0.9999940	-0.0

$$\text{RTC frequency} = \text{rtca0} + \text{rtca1} * t + \text{rtca2} * t^2$$

$$\text{Residual} = (\text{Computed RTC frequency} - \text{Measured RTC frequency}) * 1e6$$

Date, Delta F ppm



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5295
CALIBRATION DATE: 02-Feb-07

SBE 37 PRESSURE CALIBRATION DATA
2900 psia S/N 2360962

COEFFICIENTS:

PA0 = 1.115892e+000
PA1 = 1.381165e-001
PA2 = -3.900900e-008

PTCA0 = 4.221399e+001
PTCA1 = 3.716950e-001
PTCA2 = 1.094417e-003
PTCB0 = 2.599837e+001
PTCB1 = -3.325000e-003
PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	TEMP ITS90	COMPUTED PRESSURE	ERROR %FS
14.75	148.6	20.4	14.73	-0.00
593.14	4330.0	21.0	593.06	-0.00
1170.30	8514.2	21.1	1170.44	0.00
1747.71	12708.0	21.1	1747.77	0.00
2324.97	16911.7	21.2	2325.10	0.00
2902.23	21125.0	21.2	2902.35	0.00
2325.05	16909.0	21.3	2324.74	-0.01
1747.68	12705.4	21.3	1747.44	-0.01
1169.83	8511.2	21.4	1170.06	0.01
592.38	4324.8	21.6	592.35	-0.00
14.74	149.1	21.6	14.73	-0.00

THERMAL CORRECTION

TEMP ITS90	INST OUTPUT	TEMP ITS90	SPAN MV
32.50	161.61	-5.00	26.02
29.00	160.32	35.00	25.88
24.00	158.22		
18.50	155.75		
15.00	154.15		
4.50	150.25		
1.00	148.89		

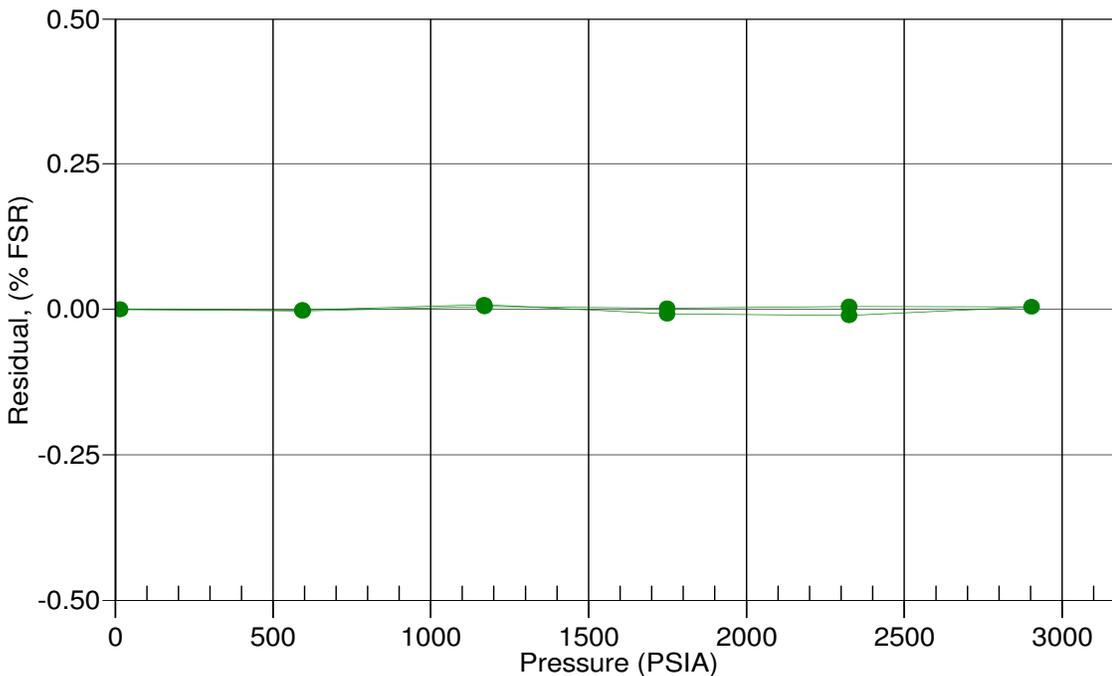
$$x = \text{pressure output} - \text{PTCA0} - \text{PTCA1} * t - \text{PTCA2} * t^2$$

$$n = x * \text{PTCB0} / (\text{PTCB0} + \text{PTCB1} * t + \text{PTCB2} * t^2)$$

$$\text{pressure (psia)} = \text{PA0} + \text{PA1} * n + \text{PA2} * n^2$$

Date, Avg Delta P %FS

● 02-Feb-07 -0.00



SBE37-SMP MicroCAT

*Conductivity & Temperature Recorder
with RS-232 Serial Interface*

Instrument Configuration:

Serial Number	37SMP45526-5296
Pressure Sensor	2000 dBar Druck, SN 2363841
Firmware Version	2.6b
Memory	2048Kb
Interface Type	RS-232
Conductivity Range	0-7 S/m
Pump Sample Rate	0.5 sec
Baud Rate	9600, 8 data bits, no parity
Maximum Depth	2000m

CAUTION - The maximum deployment depth will be limited by the measurement range of the optional pressure sensor, if installed.



Sea-Bird Electronics, Inc.

1808 136th Place NE, Bellevue, Washington 98005 USA
Website: <http://www.seabird.com>

Phone: (425) 643-9866
FAX: (425) 643-9954
Email: seabird@seabird.com

SBE Pressure Test Certificate

Test Date: 2/1/2007 Description SBE-37 Microcat

Job Number: 45526 Customer Name Woods Hole Group

SBE Sensor Information:

Model Number: 37
Serial Number: 5296

Pressure Sensor Information:

Sensor Type: Druck
Sensor Serial Number: 2363841
Sensor Rating: 2900

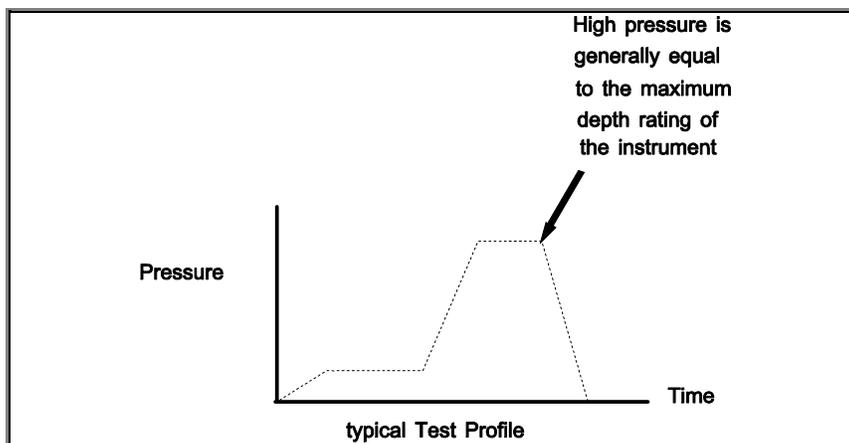
Pressure Test Protocol:

Low Pressure Test: 50 PSI Held For 15 Minutes

High Pressure Test: 2900 PSI Held For 15 Minutes

Passed Test:

Tested By: PCC



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5296
CALIBRATION DATE: 04-Feb-07

SBE 37 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

ITS-90 COEFFICIENTS

a0 = 2.528775e-005

a1 = 2.644945e-004

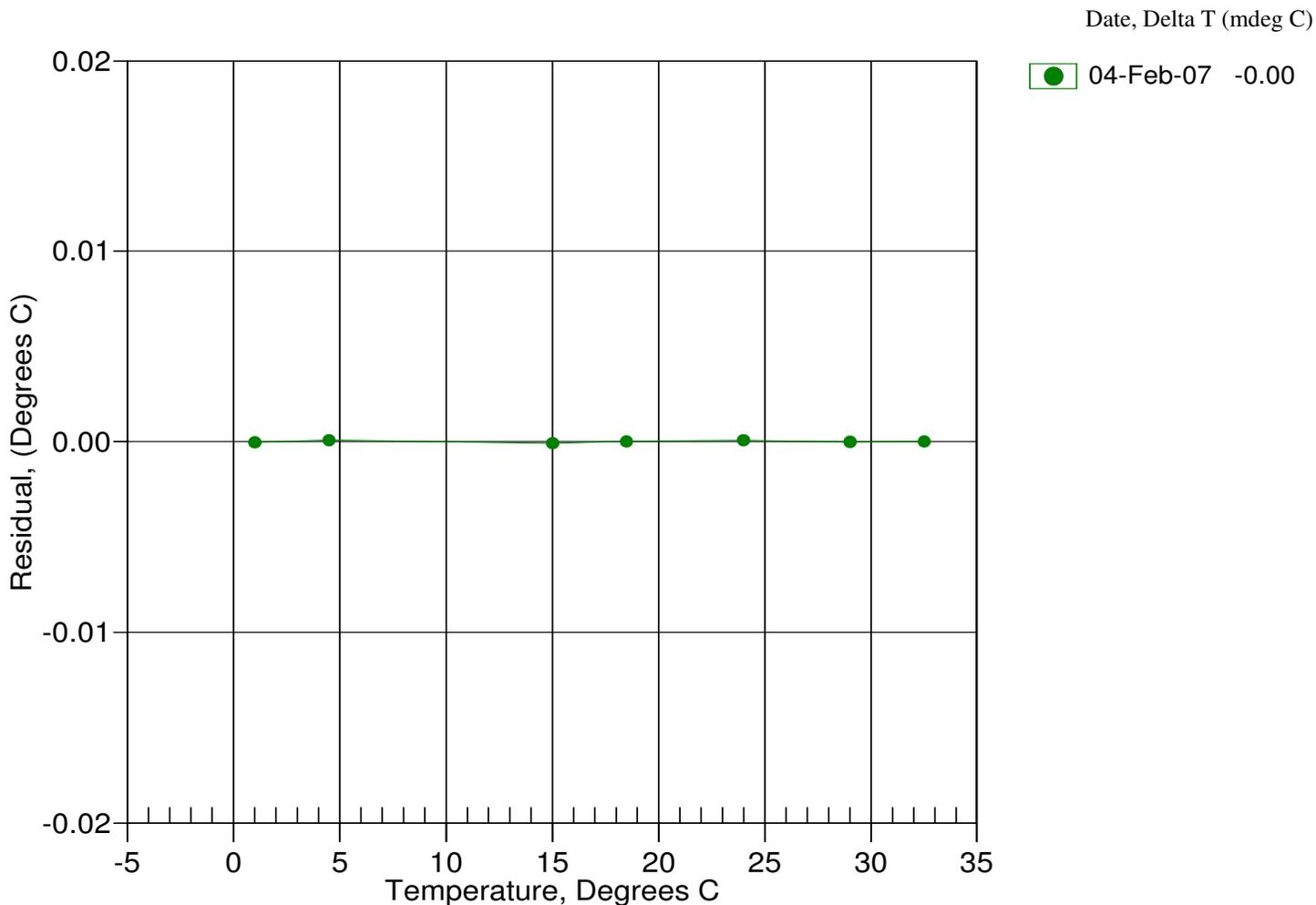
a2 = -1.656857e-006

a3 = 1.325010e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
0.9999	801682.7	0.9999	-0.0000
4.5000	684991.6	4.5001	0.0001
15.0000	435724.7	14.9999	-0.0001
18.5000	377054.2	18.5000	0.0000
24.0000	302187.4	24.0001	0.0001
29.0000	248606.8	29.0000	-0.0000
32.5000	217574.5	32.5000	-0.0000

Temperature ITS-90 = $1 / \{ a_0 + a_1[\ln(n)] + a_2[\ln^2(n)] + a_3[\ln^3(n)] \} - 273.15$ (°C)

Residual = instrument temperature - bath temperature



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5296
CALIBRATION DATE: 04-Feb-07

SBE 37 CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

g = -1.002374e+000	CPcor = -9.5700e-008
h = 1.552572e-001	CTcor = 3.2500e-006
i = -1.628872e-004	WBOTC = 1.9085e-005
j = 3.928407e-005	

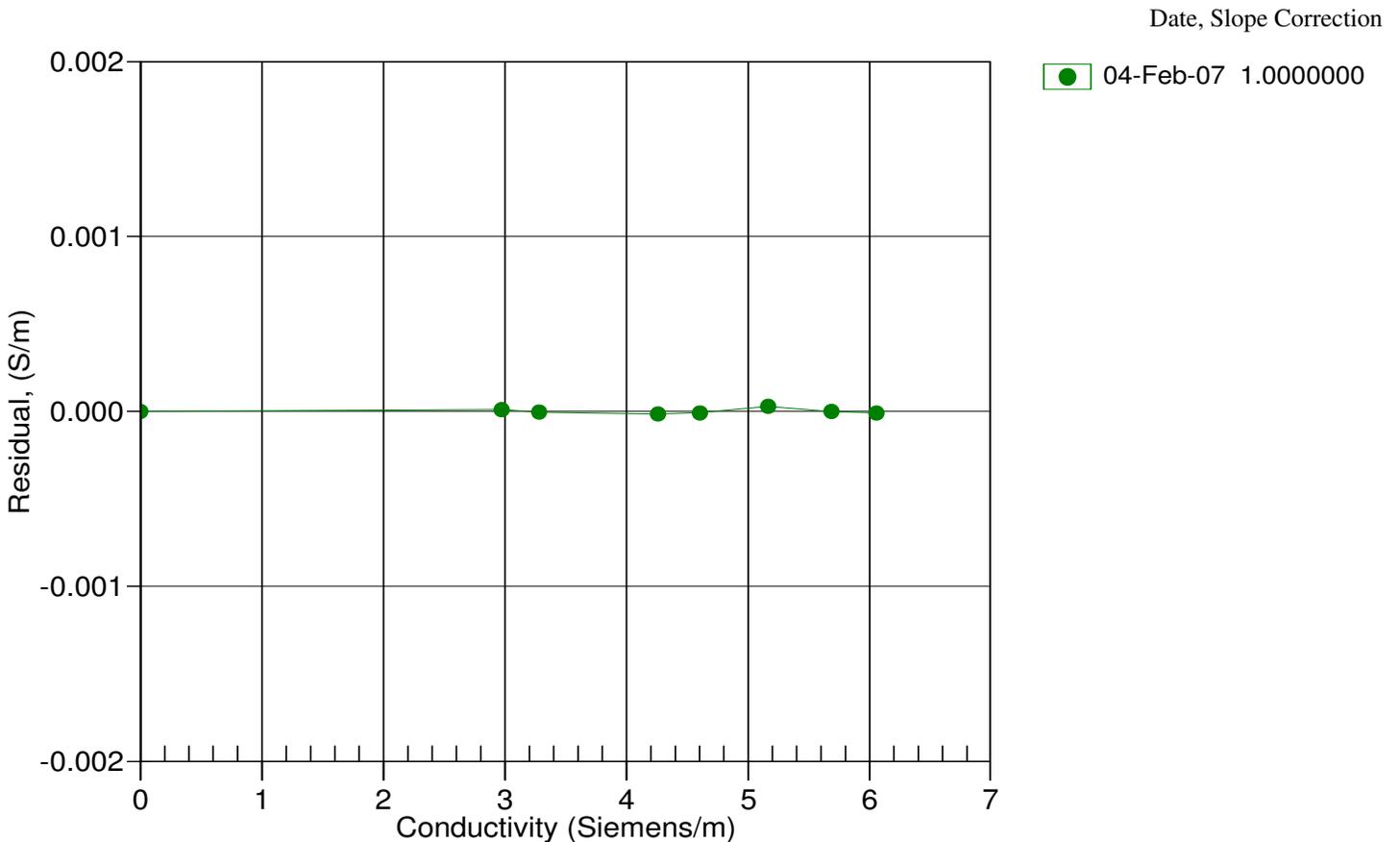
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2541.69	0.00000	0.00000
0.9999	34.7766	2.97289	5057.09	2.97290	0.00001
4.5000	34.7571	3.27969	5247.67	3.27968	-0.00000
15.0000	34.7151	4.26051	5814.32	4.26049	-0.00002
18.5000	34.7064	4.60536	6000.55	4.60535	-0.00001
24.0000	34.6971	5.16285	6289.62	5.16288	0.00003
29.0000	34.6924	5.68431	6548.07	5.68430	-0.00000
32.5000	34.6901	6.05647	6726.25	6.05646	-0.00001

$$f = \text{INST FREQ} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$$

$$\text{Conductivity} = (g + hf^2 + if^3 + jf^4) / (1 + \delta t + \epsilon p) \text{ Siemens/meter}$$

$$t = \text{temperature}[^{\circ}\text{C}]; p = \text{pressure}[\text{decibars}]; \delta = \text{CTcor}; \epsilon = \text{CPcor};$$

$$\text{Residual} = \text{instrument conductivity} - \text{bath conductivity}$$



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5296
CALIBRATION DATE: 04-Feb-07

SBE 37 RTC CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

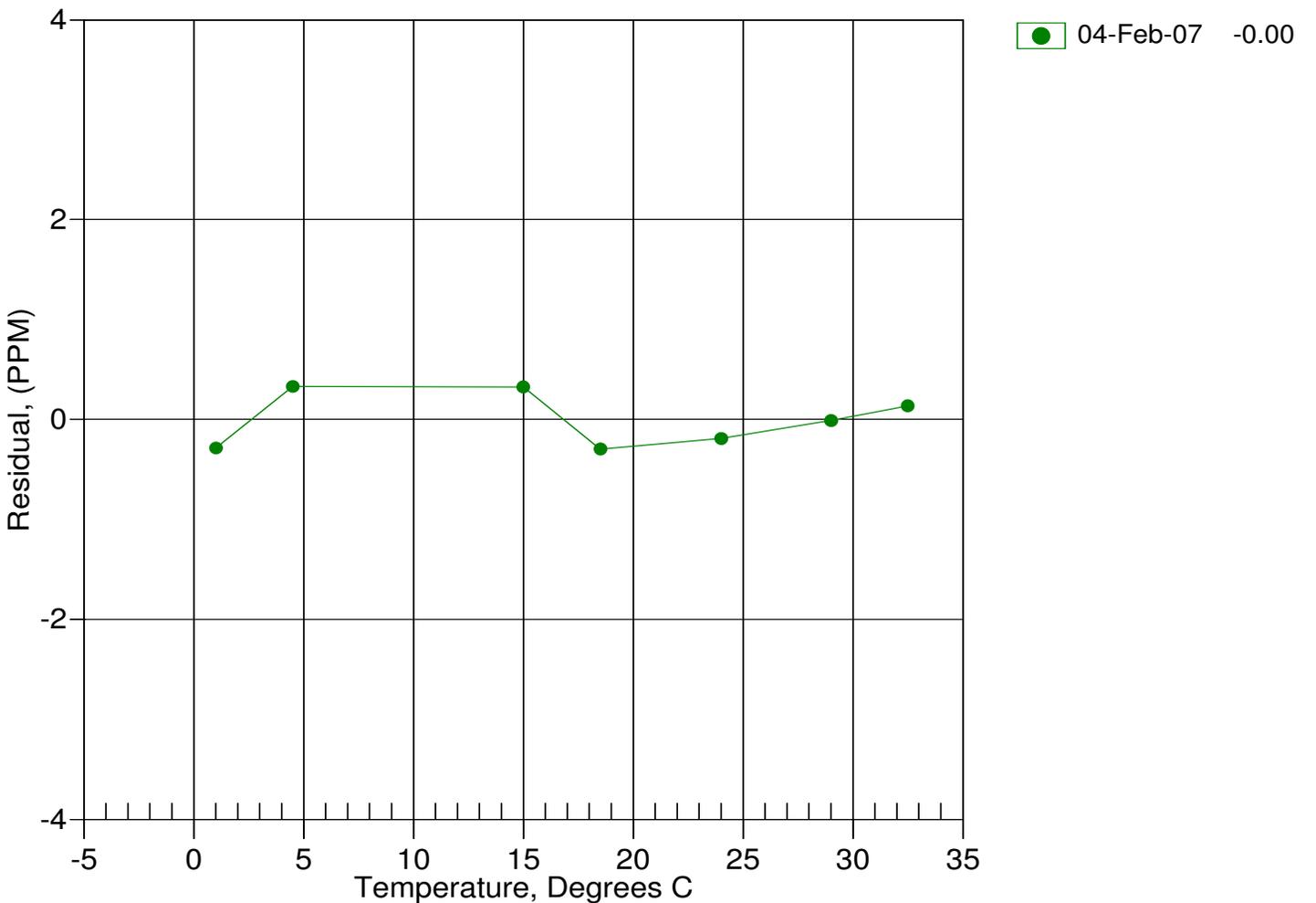
rtca0 = 9.999740e-001
rtca1 = 1.786048e-006
rtca2 = -3.301561e-008

BATH TEMP (ITS-90)	RTC FREQ (Hz)	COMPUTED FREQ (Hz)	RESIDUAL (PPM)
0.9999	0.9999760	0.9999757	-0.3
4.5000	0.9999810	0.9999813	0.3
15.0000	0.9999930	0.9999933	0.3
18.5000	0.9999960	0.9999957	-0.3
24.0000	0.9999980	0.9999978	-0.2
29.0000	0.9999980	0.9999980	-0.0
32.5000	0.9999970	0.9999971	0.1

$$\text{RTC frequency} = \text{rtca0} + \text{rtca1} * t + \text{rtca2} * t^2$$

$$\text{Residual} = (\text{Computed RTC frequency} - \text{Measured RTC frequency}) * 1e6$$

Date, Delta F ppm



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5296
CALIBRATION DATE: 02-Feb-07

SBE 37 PRESSURE CALIBRATION DATA
2900 psia S/N 2363841

COEFFICIENTS:

PA0 = -1.946951e-001
PA1 = 1.380781e-001
PA2 = -3.907892e-008

PTCA0 = 5.068725e+001
PTCA1 = -2.530433e-001
PTCA2 = 9.004761e-003
PTCB0 = 2.597388e+001
PTCB1 = -2.250000e-004
PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	TEMP ITS90	COMPUTED PRESSURE	ERROR %FS
14.75	157.7	20.4	14.78	0.00
593.14	4350.3	21.0	593.06	-0.00
1170.30	8546.3	21.1	1170.44	0.00
1747.71	12752.1	21.1	1747.79	0.00
2324.97	16967.8	21.2	2325.11	0.00
2902.23	21193.0	21.2	2902.34	0.00
2325.05	16965.0	21.3	2324.73	-0.01
1747.68	12750.0	21.3	1747.50	-0.01
1169.83	8543.1	21.4	1170.00	0.01
592.38	4345.2	21.6	592.35	-0.00
14.74	157.3	21.6	14.70	-0.00

THERMAL CORRECTION

TEMP ITS90	INST OUTPUT	TEMP ITS90	SPAN MV
32.50	167.83	-5.00	25.98
29.00	167.05	35.00	25.97
24.00	165.93		
18.50	165.00		
15.00	164.76		
4.50	165.86		
1.00	166.37		

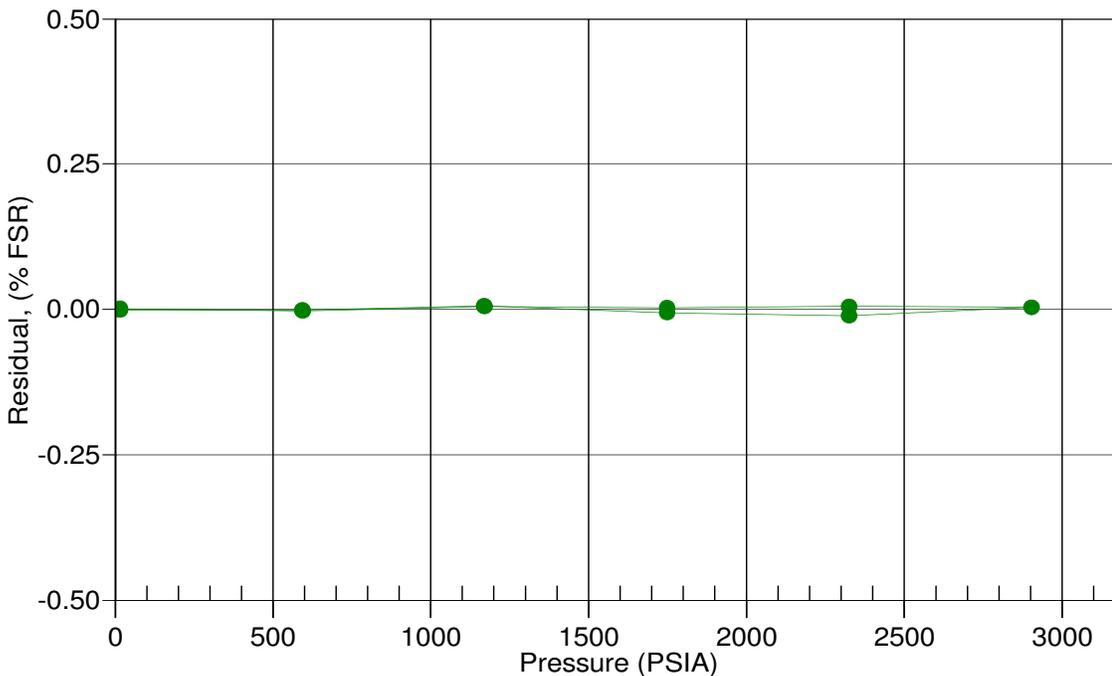
$$x = \text{pressure output} - \text{PTCA0} - \text{PTCA1} * t - \text{PTCA2} * t^2$$

$$n = x * \text{PTCB0} / (\text{PTCB0} + \text{PTCB1} * t + \text{PTCB2} * t^2)$$

$$\text{pressure (psia)} = \text{PA0} + \text{PA1} * n + \text{PA2} * n^2$$

Date, Avg Delta P %FS

● 02-Feb-07 -0.00



SBE37-SMP MicroCAT

*Conductivity & Temperature Recorder
with RS-232 Serial Interface*

Instrument Configuration:

Serial Number	37SMP45526-5297
Pressure Sensor	2000 dBar Druck, SN 2385222
Firmware Version	2.6b
Memory	2048Kb
Interface Type	RS-232
Conductivity Range	0-7 S/m
Pump Sample Rate	0.5 sec
Baud Rate	9600, 8 data bits, no parity
Maximum Depth	2000m

CAUTION - The maximum deployment depth will be limited by the measurement range of the optional pressure sensor, if installed.



Sea-Bird Electronics, Inc.

1808 136th Place NE, Bellevue, Washington 98005 USA
Website: <http://www.seabird.com>

Phone: (425) 643-9866
FAX: (425) 643-9954
Email: seabird@seabird.com

SBE Pressure Test Certificate

Test Date: 2/1/2007 Description SBE-37 Microcat

Job Number: 45526 Customer Name Woods Hole Group

SBE Sensor Information:

Model Number: 37
Serial Number: 5297

Pressure Sensor Information:

Sensor Type: Druck
Sensor Serial Number: 2385222
Sensor Rating: 2900

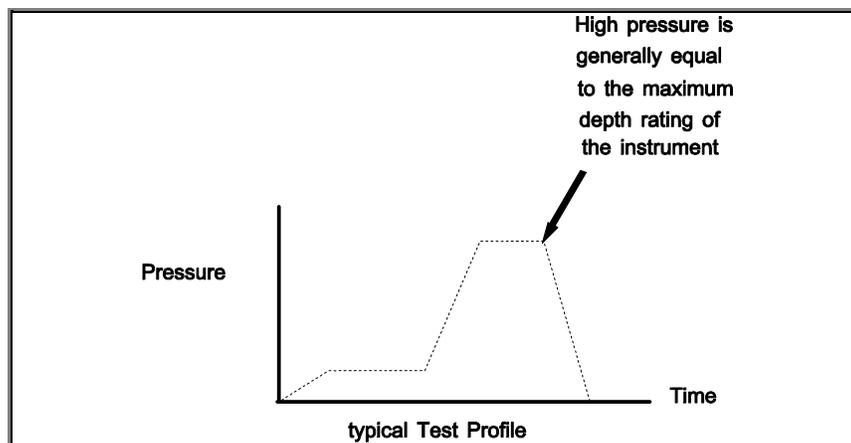
Pressure Test Protocol:

Low Pressure Test: 50 PSI Held For 15 Minutes

High Pressure Test: 2900 PSI Held For 15 Minutes

Passed Test:

Tested By: PCC



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5297
CALIBRATION DATE: 04-Feb-07

SBE 37 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

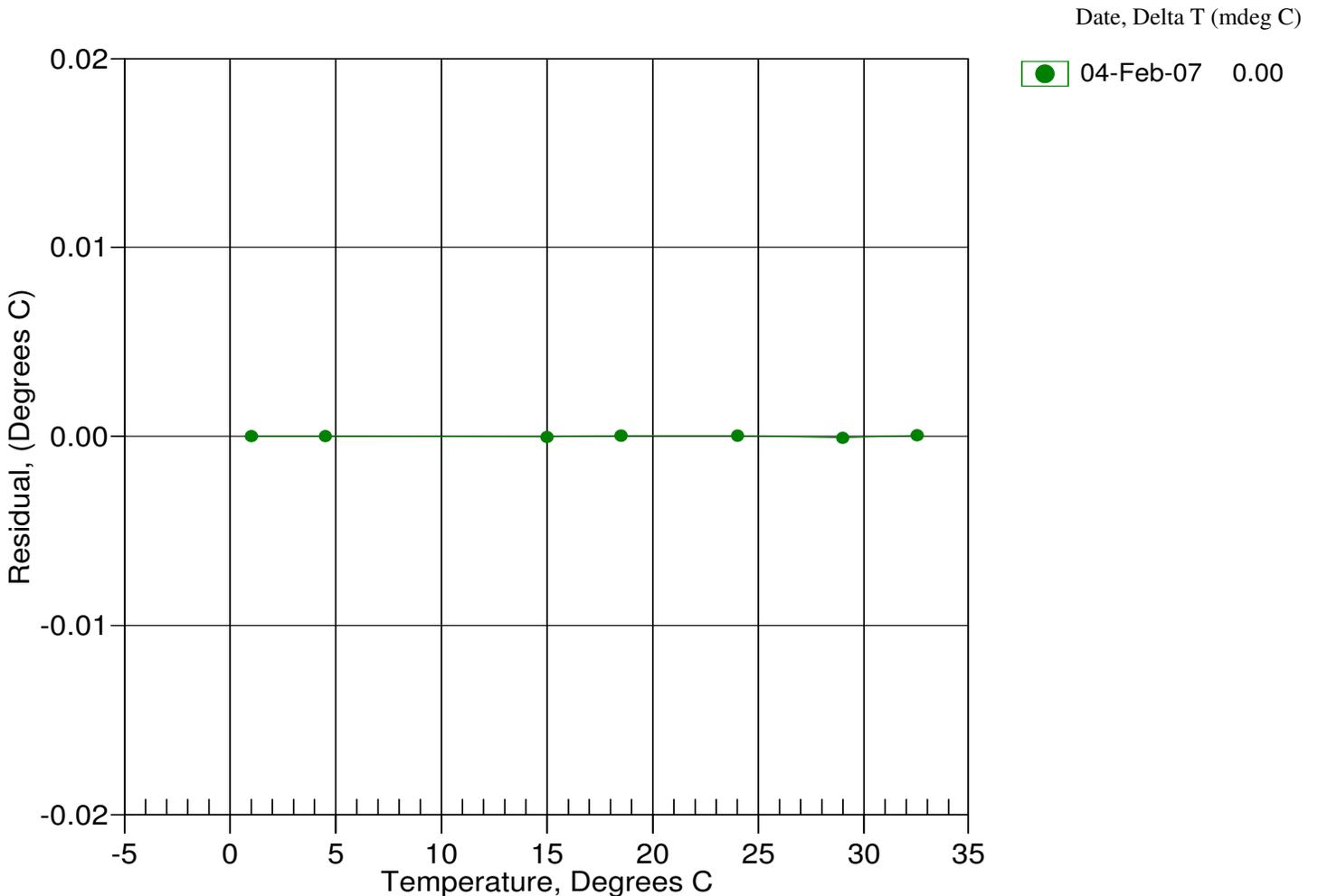
ITS-90 COEFFICIENTS

a0 = 3.542226e-006
a1 = 2.648563e-004
a2 = -1.575634e-006
a3 = 1.298343e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
0.9999	825233.4	0.9999	0.0000
4.5000	705614.0	4.5000	-0.0000
15.0000	449768.2	15.0000	-0.0000
18.5000	389469.7	18.5000	0.0000
24.0000	312463.9	24.0000	0.0000
29.0000	257300.4	28.9999	-0.0001
32.5000	225326.5	32.5000	0.0000

Temperature ITS-90 = $1 / \{ a_0 + a_1[\ln(n)] + a_2[\ln^2(n)] + a_3[\ln^3(n)] \} - 273.15$ (°C)

Residual = instrument temperature - bath temperature



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5297
CALIBRATION DATE: 04-Feb-07

SBE 37 CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

g = -1.003399e+000	CPcor = -9.5700e-008
h = 1.537026e-001	CTcor = 3.2500e-006
i = -1.552588e-004	WBOTC = 1.9175e-005
j = 3.798056e-005	

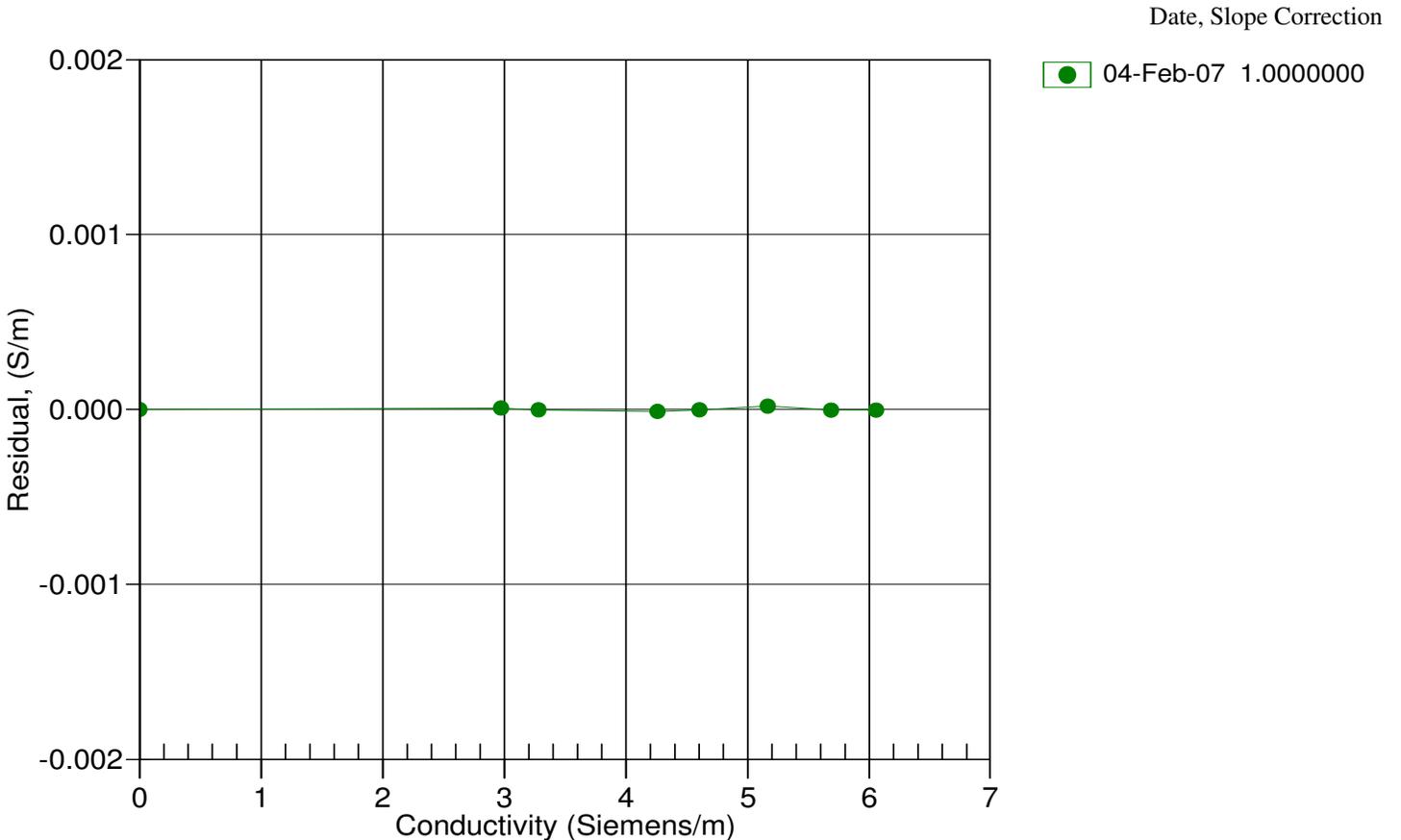
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2555.73	0.00000	0.00000
0.9999	34.7766	2.97289	5083.04	2.97289	0.00001
4.5000	34.7571	3.27969	5274.56	3.27969	-0.00000
15.0000	34.7151	4.26051	5843.98	4.26050	-0.00001
18.5000	34.7064	4.60536	6031.12	4.60536	-0.00000
24.0000	34.6971	5.16285	6321.61	5.16287	0.00002
29.0000	34.6924	5.68431	6581.35	5.68430	-0.00000
32.5000	34.6901	6.05647	6760.42	6.05646	-0.00000

$$f = \text{INST FREQ} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$$

$$\text{Conductivity} = (g + hf^2 + if^3 + jf^4) / (1 + \delta t + \epsilon p) \text{ Siemens/meter}$$

t = temperature[°C]; p = pressure[decibars]; δ = CTcor; ϵ = CPcor;

Residual = instrument conductivity - bath conductivity



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5297
CALIBRATION DATE: 04-Feb-07

SBE 37 RTC CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

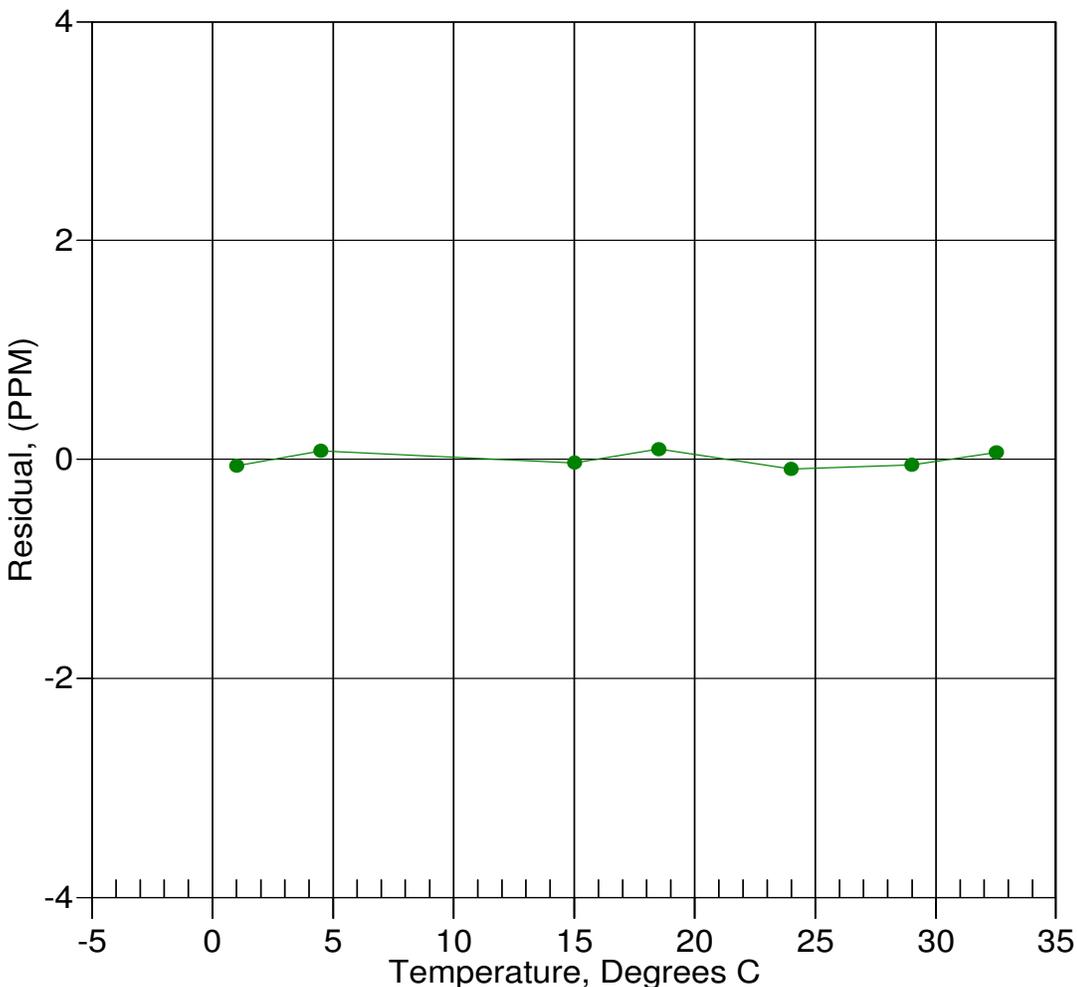
rtca0 = 9.999743e-001
rtca1 = 1.636612e-006
rtca2 = -3.073088e-008

BATH TEMP (ITS-90)	RTC FREQO (Hz)	COMPUTED FREQO (Hz)	RESIDUAL (PPM)
0.9999	0.9999760	0.9999759	-0.1
4.5000	0.9999810	0.9999811	0.1
15.0000	0.9999920	0.9999920	-0.0
18.5000	0.9999940	0.9999941	0.1
24.0000	0.9999960	0.9999959	-0.1
29.0000	0.9999960	0.9999960	-0.0
32.5000	0.9999950	0.9999951	0.1

$$\text{RTC frequency} = \text{rtca0} + \text{rtca1} * t + \text{rtca2} * t^2$$

$$\text{Residual} = (\text{Computed RTC frequency} - \text{Measured RTC frequency}) * 1e6$$

Date, Delta F ppm



04-Feb-07 0.00

SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5297
CALIBRATION DATE: 02-Feb-07

SBE 37 PRESSURE CALIBRATION DATA
2900 psia S/N 2385222

COEFFICIENTS:

PA0 = 5.847827e-001
PA1 = 1.377510e-001
PA2 = -3.627879e-008

PTCA0 = 4.949773e+001
PTCA1 = 2.706087e-001
PTCA2 = -3.516416e-003
PTCB0 = 2.612800e+001
PTCB1 = 4.000000e-004
PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	TEMP ITS90	COMPUTED PRESSURE	ERROR %FS
14.74	156.7	22.0	14.76	0.00
592.11	4354.2	22.1	592.10	-0.00
1169.47	8561.2	22.1	1169.47	0.00
1746.66	12776.6	22.1	1746.71	0.00
2323.82	17001.3	22.1	2323.92	0.00
2901.00	21234.0	22.1	2900.93	-0.00
2323.61	16999.1	22.1	2323.62	0.00
1746.60	12775.6	22.1	1746.57	-0.00
1169.08	8557.8	22.1	1169.01	-0.00
591.60	4350.2	22.3	591.55	-0.00
14.73	156.7	22.4	14.76	0.00

THERMAL CORRECTION

TEMP ITS90	INST OUTPUT	TEMP ITS90	SPAN MV
32.50	164.91	-5.00	26.13
29.00	164.99	35.00	26.14
24.00	164.60		
18.50	163.73		
15.00	163.07		
4.50	161.20		
1.00	160.22		

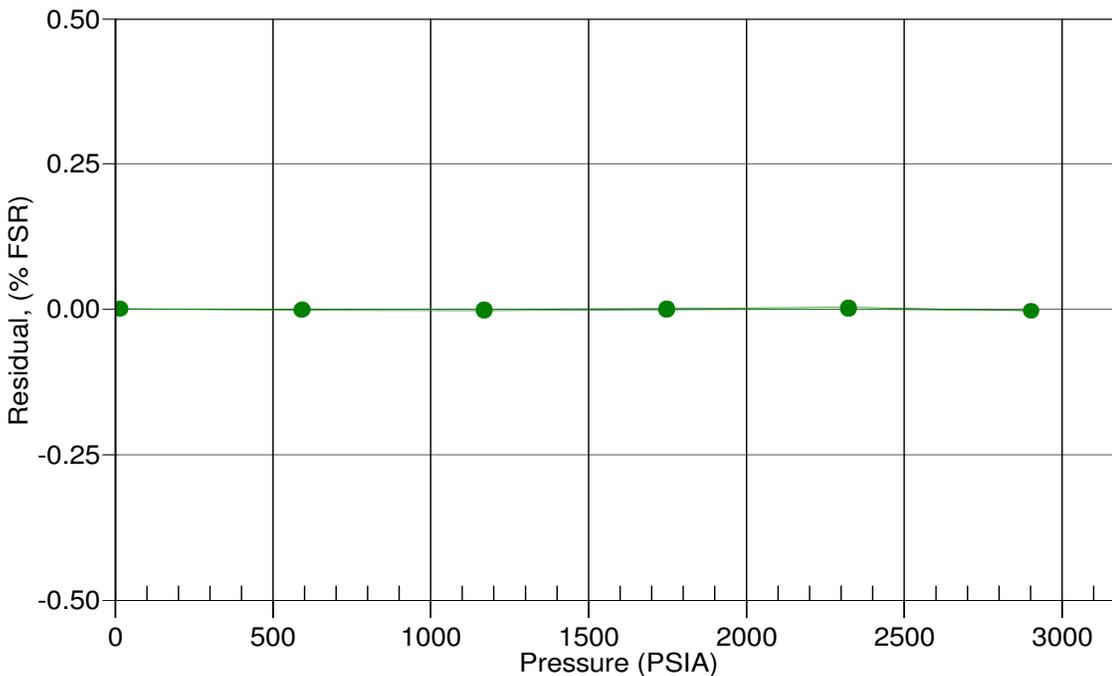
$$x = \text{pressure output} - \text{PTCA0} - \text{PTCA1} * t - \text{PTCA2} * t^2$$

$$n = x * \text{PTCB0} / (\text{PTCB0} + \text{PTCB1} * t + \text{PTCB2} * t^2)$$

$$\text{pressure (psia)} = \text{PA0} + \text{PA1} * n + \text{PA2} * n^2$$

Date, Avg Delta P %FS

● 02-Feb-07 -0.00



SBE37-SMP MicroCAT

*Conductivity & Temperature Recorder
with RS-232 Serial Interface*

Instrument Configuration:

Serial Number	37SMP45526-5298
Pressure Sensor	2000 dBar Druck, SN 2385223
Firmware Version	2.6b
Memory	2048Kb
Interface Type	RS-232
Conductivity Range	0-7 S/m
Pump Sample Rate	0.5 sec
Baud Rate	9600, 8 data bits, no parity
Maximum Depth	2000m

CAUTION - The maximum deployment depth will be limited by the measurement range of the optional pressure sensor, if installed.



Sea-Bird Electronics, Inc.

1808 136th Place NE, Bellevue, Washington 98005 USA

Website: <http://www.seabird.com>

Phone: (425) 643-9866

FAX: (425) 643-9954

Email: seabird@seabird.com

SBE Pressure Test Certificate

Test Date: 2/1/2007 Description SBE-37 Microcat

Job Number: 45526 Customer Name Woods Hole Group

SBE Sensor Information:

Model Number: 37

Serial Number: 5298

Pressure Sensor Information:

Sensor Type: Druck

Sensor Serial Number: 2385223

Sensor Rating: 2900

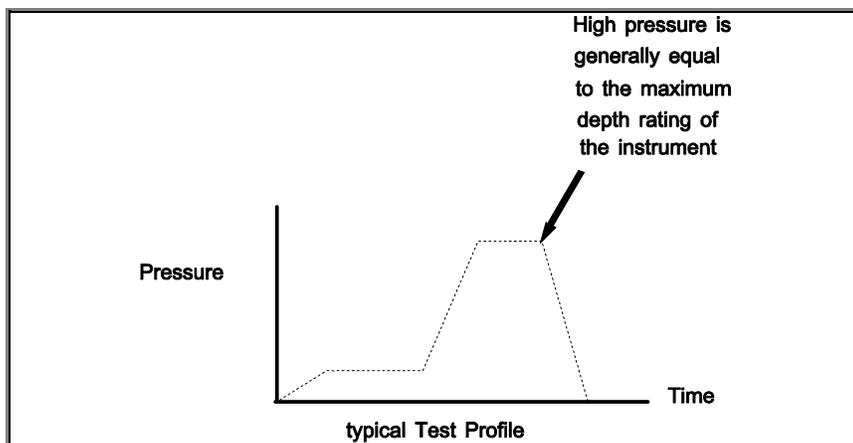
Pressure Test Protocol:

Low Pressure Test: 50 PSI Held For 15 Minutes

High Pressure Test: 2900 PSI Held For 15 Minutes

Passed Test:

Tested By: PCC



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5298
CALIBRATION DATE: 04-Feb-07

SBE 37 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

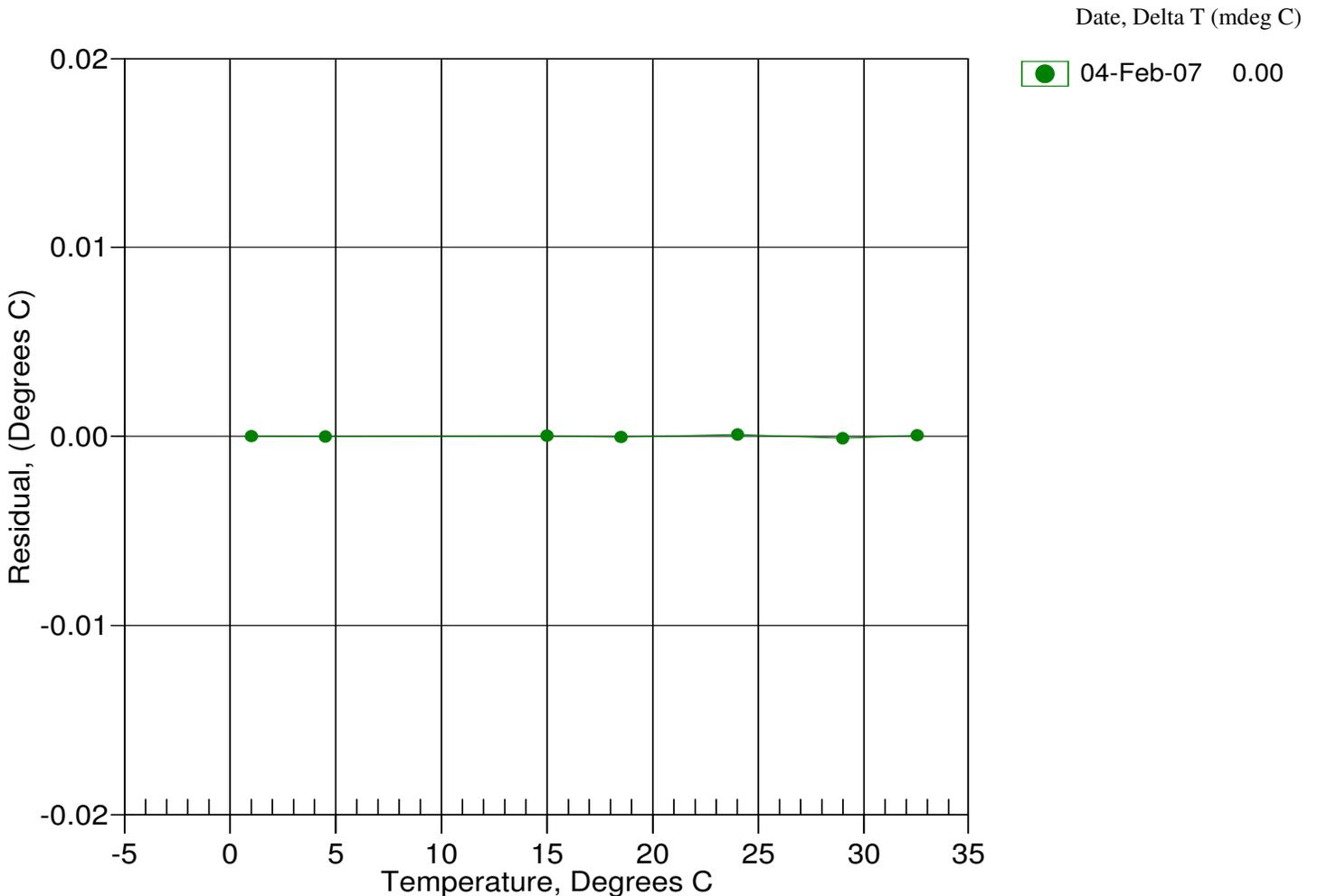
ITS-90 COEFFICIENTS

a0 = 4.371987e-006
a1 = 2.630790e-004
a2 = -1.416936e-006
a3 = 1.256967e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
0.9999	837626.5	0.9999	0.0000
4.5000	716346.7	4.5000	-0.0000
15.0000	456861.3	15.0000	0.0000
18.5000	395684.9	18.5000	-0.0000
24.0000	317535.7	24.0001	0.0001
29.0000	261541.2	28.9999	-0.0001
32.5000	229077.9	32.5000	0.0000

Temperature ITS-90 = $1 / \{ a_0 + a_1[\ln(n)] + a_2[\ln^2(n)] + a_3[\ln^3(n)] \} - 273.15$ (°C)

Residual = instrument temperature - bath temperature



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5298
CALIBRATION DATE: 04-Feb-07

SBE 37 CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

g = -9.827839e-001	CPcor = -9.5700e-008
h = 1.524294e-001	CTcor = 3.2500e-006
i = -1.339418e-004	WBOTC = 1.8641e-005
j = 3.677465e-005	

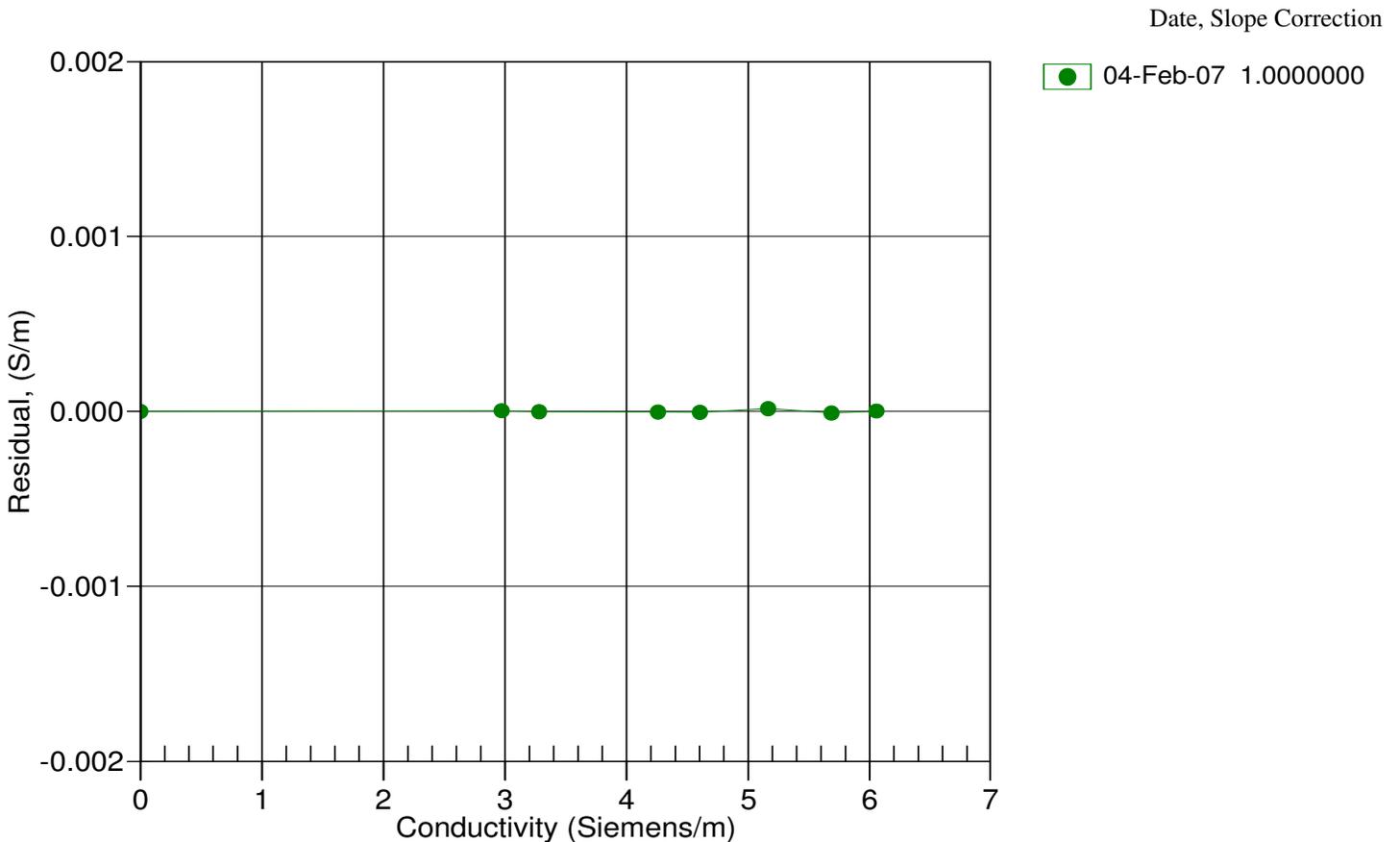
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2539.52	0.00000	0.00000
0.9999	34.7766	2.97289	5089.64	2.97289	0.00000
4.5000	34.7571	3.27969	5282.35	3.27969	-0.00000
15.0000	34.7151	4.26051	5855.14	4.26051	-0.00000
18.5000	34.7064	4.60536	6043.32	4.60536	-0.00001
24.0000	34.6971	5.16285	6335.40	5.16287	0.00002
29.0000	34.6924	5.68431	6596.51	5.68430	-0.00001
32.5000	34.6901	6.05647	6776.51	6.05647	0.00000

$f = \text{INST FREQ} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$

$\text{Conductivity} = (g + hf^2 + if^3 + jf^4) / (1 + \delta t + \epsilon p)$ Siemens/meter

t = temperature[°C]; p = pressure[decibars]; $\delta = \text{CTcor}$; $\epsilon = \text{CPcor}$;

Residual = instrument conductivity - bath conductivity



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5298
CALIBRATION DATE: 04-Feb-07

SBE 37 RTC CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

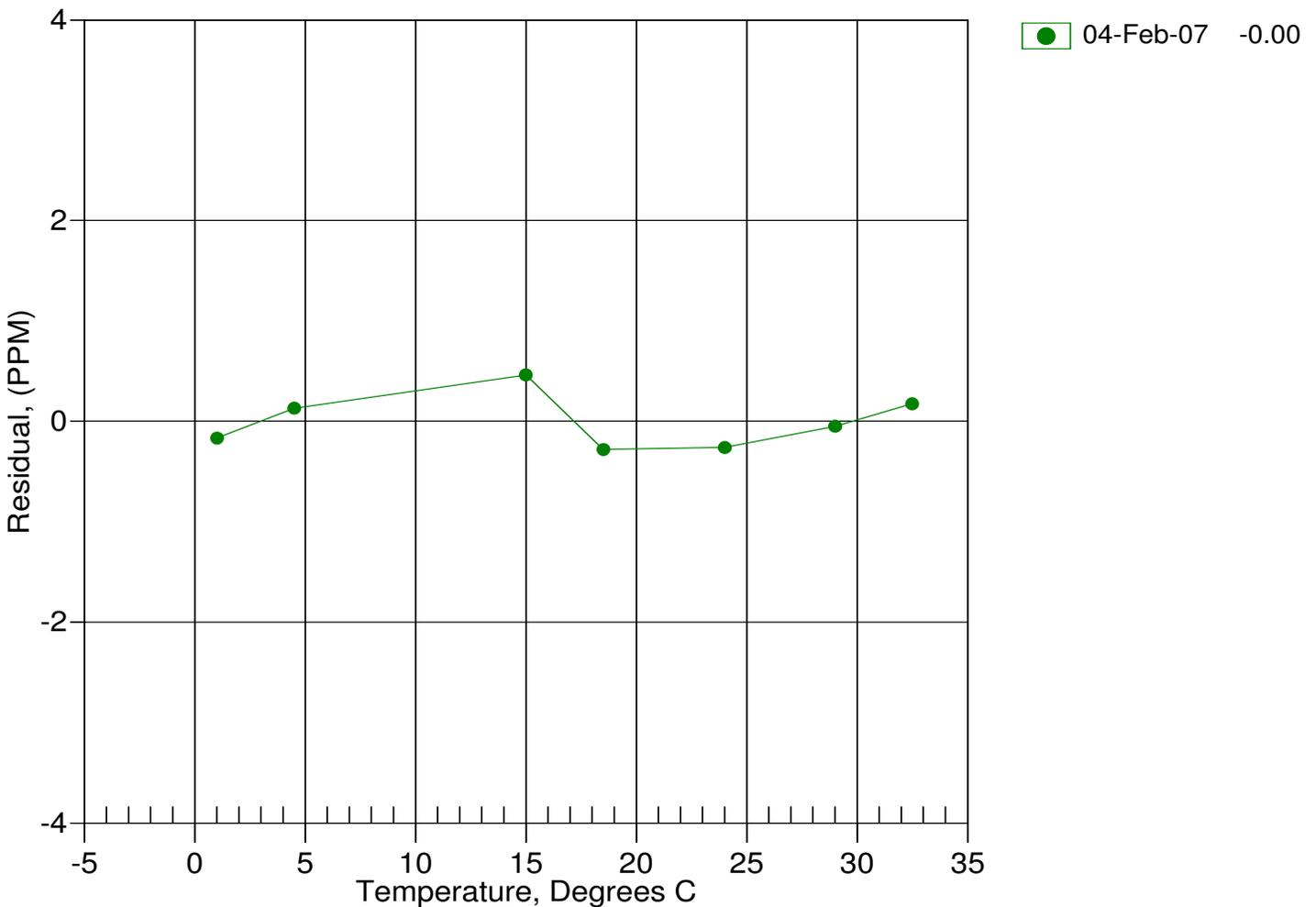
rtca0 = 9.999702e-001
rtca1 = 1.682957e-006
rtca2 = -3.096101e-008

BATH TEMP (ITS-90)	RTC FREQ (Hz)	COMPUTED FREQ (Hz)	RESIDUAL (PPM)
0.9999	0.9999720	0.9999718	-0.2
4.5000	0.9999770	0.9999771	0.1
15.0000	0.9999880	0.9999885	0.5
18.5000	0.9999910	0.9999907	-0.3
24.0000	0.9999930	0.9999927	-0.3
29.0000	0.9999930	0.9999929	-0.1
32.5000	0.9999920	0.9999922	0.2

$$\text{RTC frequency} = \text{rtca0} + \text{rtca1} * t + \text{rtca2} * t^2$$

$$\text{Residual} = (\text{Computed RTC frequency} - \text{Measured RTC frequency}) * 1e6$$

Date, Delta F ppm



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5298
CALIBRATION DATE: 02-Feb-07

SBE 37 PRESSURE CALIBRATION DATA
2900 psia S/N 2385223

COEFFICIENTS:

PA0 = -9.774579e-002
PA1 = 1.378145e-001
PA2 = -4.047679e-008

PTCA0 = 3.787339e+001
PTCA1 = -3.423236e-003
PTCA2 = -1.313703e-003
PTCB0 = 2.615188e+001
PTCB1 = -2.025000e-003
PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	TEMP ITS90	COMPUTED PRESSURE	ERROR %FS
14.74	144.6	22.0	14.73	-0.00
592.11	4332.2	22.1	592.09	-0.00
1169.47	8530.2	22.1	1169.44	-0.00
1746.66	12737.9	22.1	1746.69	0.00
2323.82	16955.7	22.1	2323.89	0.00
2901.00	21183.1	22.1	2900.95	-0.00
2323.61	16953.8	22.1	2323.63	0.00
1746.60	12737.0	22.1	1746.57	-0.00
1169.08	8527.3	22.1	1169.05	-0.00
591.60	4328.6	22.3	591.60	0.00
14.73	144.8	22.4	14.76	0.00

THERMAL CORRECTION

TEMP ITS90	INST OUTPUT	TEMP ITS90	SPAN MV
32.50	150.70	-5.00	26.16
29.00	151.38	35.00	26.08
24.00	151.82		
18.50	151.88		
15.00	151.90		
4.50	152.21		
1.00	152.58		

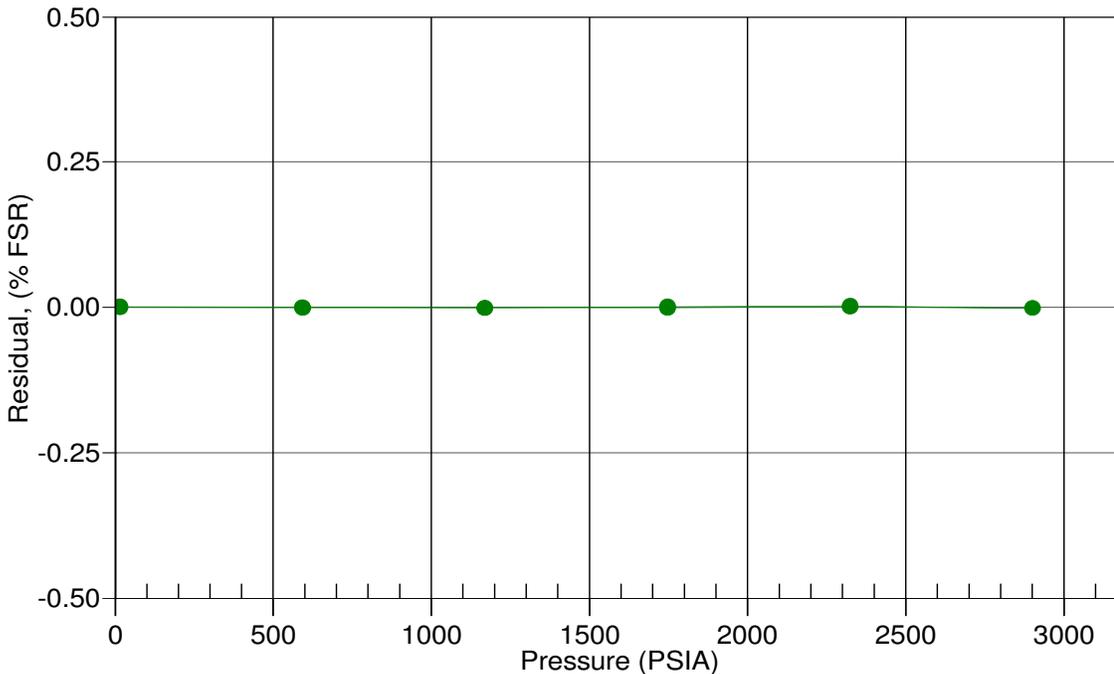
$$x = \text{pressure output} - \text{PTCA0} - \text{PTCA1} * t - \text{PTCA2} * t^2$$

$$n = x * \text{PTCB0} / (\text{PTCB0} + \text{PTCB1} * t + \text{PTCB2} * t^2)$$

$$\text{pressure (psia)} = \text{PA0} + \text{PA1} * n + \text{PA2} * n^2$$

Date, Avg Delta P %FS

02-Feb-07 0.00



SBE37-SMP MicroCAT

*Conductivity & Temperature Recorder
with RS-232 Serial Interface*

Instrument Configuration:

Serial Number	37SMP45526-5299
Pressure Sensor	2000 dBar Druck, SN 2385224
Firmware Version	2.6b
Memory	2048Kb
Interface Type	RS-232
Conductivity Range	0-7 S/m
Pump Sample Rate	0.5 sec
Baud Rate	9600, 8 data bits, no parity
Maximum Depth	2000m

CAUTION - The maximum deployment depth will be limited by the measurement range of the optional pressure sensor, if installed.



Sea-Bird Electronics, Inc.

1808 136th Place NE, Bellevue, Washington 98005 USA
Website: <http://www.seabird.com>

Phone: (425) 643-9866
FAX: (425) 643-9954
Email: seabird@seabird.com

SBE Pressure Test Certificate

Test Date: 2/1/2007 Description SBE-37 Microcat

Job Number: 45526 Customer Name Woods Hole Group

SBE Sensor Information:

Model Number: 37

Serial Number: 5299

Pressure Sensor Information:

Sensor Type: Druck

Sensor Serial Number: 2385224

Sensor Rating: 2900

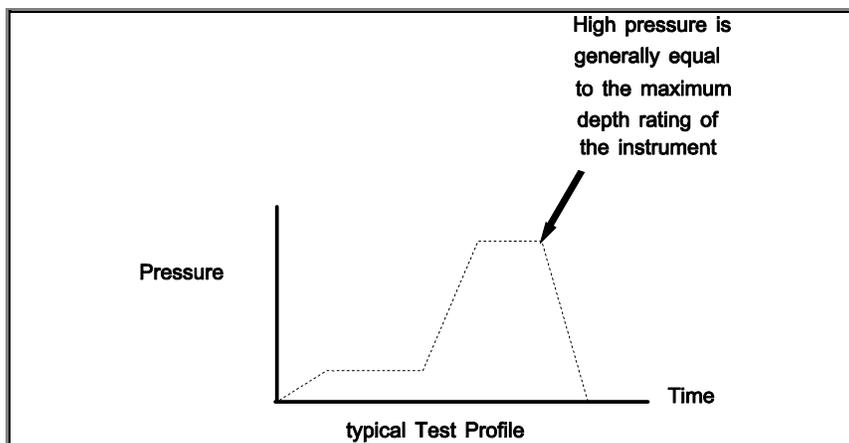
Pressure Test Protocol:

Low Pressure Test: 50 PSI Held For 15 Minutes

High Pressure Test: 2900 PSI Held For 15 Minutes

Passed Test:

Tested By: PCC



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5299
CALIBRATION DATE: 04-Feb-07

SBE 37 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

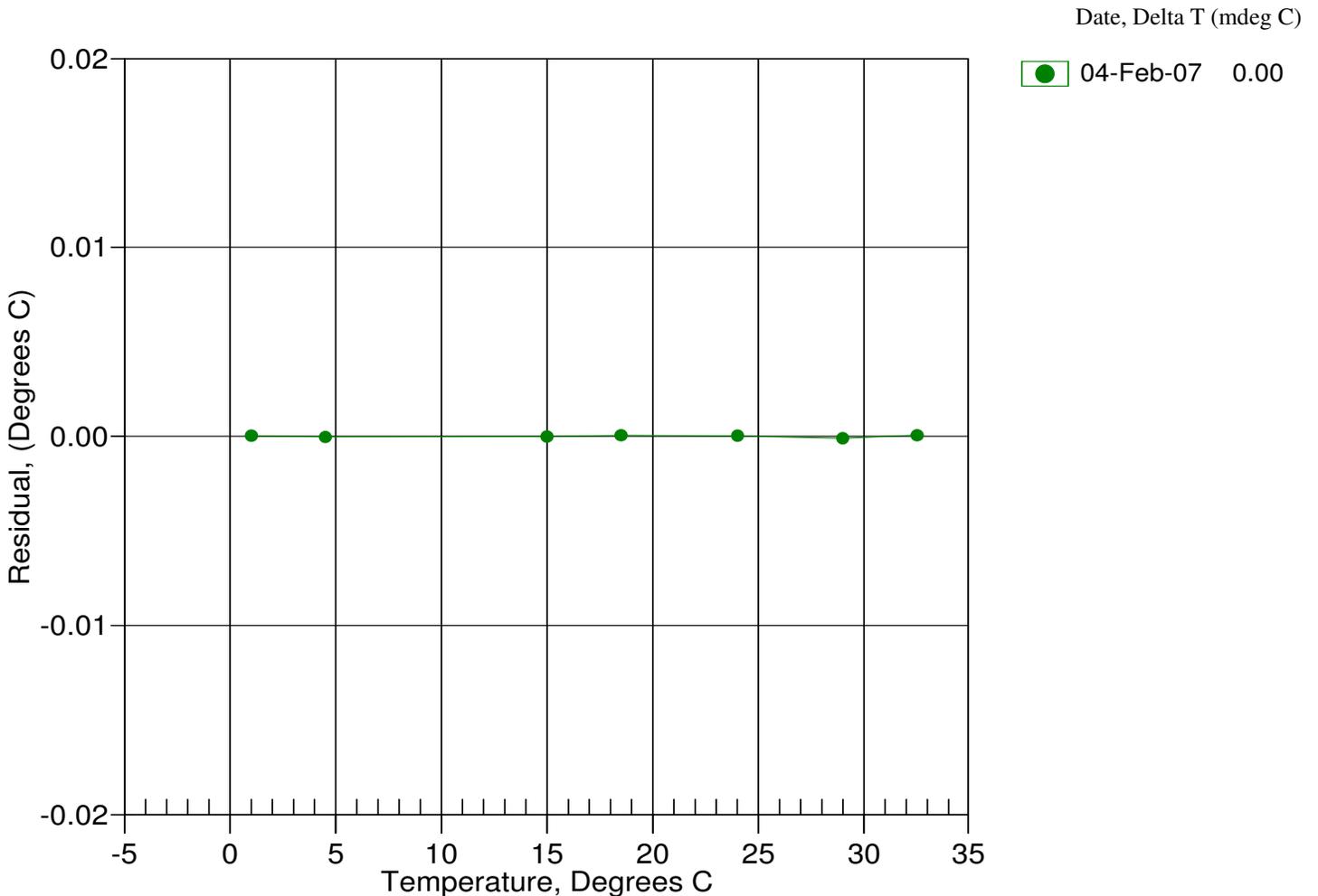
ITS-90 COEFFICIENTS

a0 = -1.218028e-005
a1 = 2.698143e-004
a2 = -1.842775e-006
a3 = 1.410972e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
0.9999	744339.3	0.9999	0.0000
4.5000	637498.5	4.5000	-0.0000
15.0000	408259.5	15.0000	-0.0000
18.5000	354049.9	18.5001	0.0001
24.0000	284688.1	24.0000	0.0000
29.0000	234891.2	28.9999	-0.0001
32.5000	205977.4	32.5001	0.0001

Temperature ITS-90 = $1 / \{ a_0 + a_1[\ln(n)] + a_2[\ln^2(n)] + a_3[\ln^3(n)] \} - 273.15$ (°C)

Residual = instrument temperature - bath temperature



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5299
CALIBRATION DATE: 04-Feb-07

SBE 37 CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

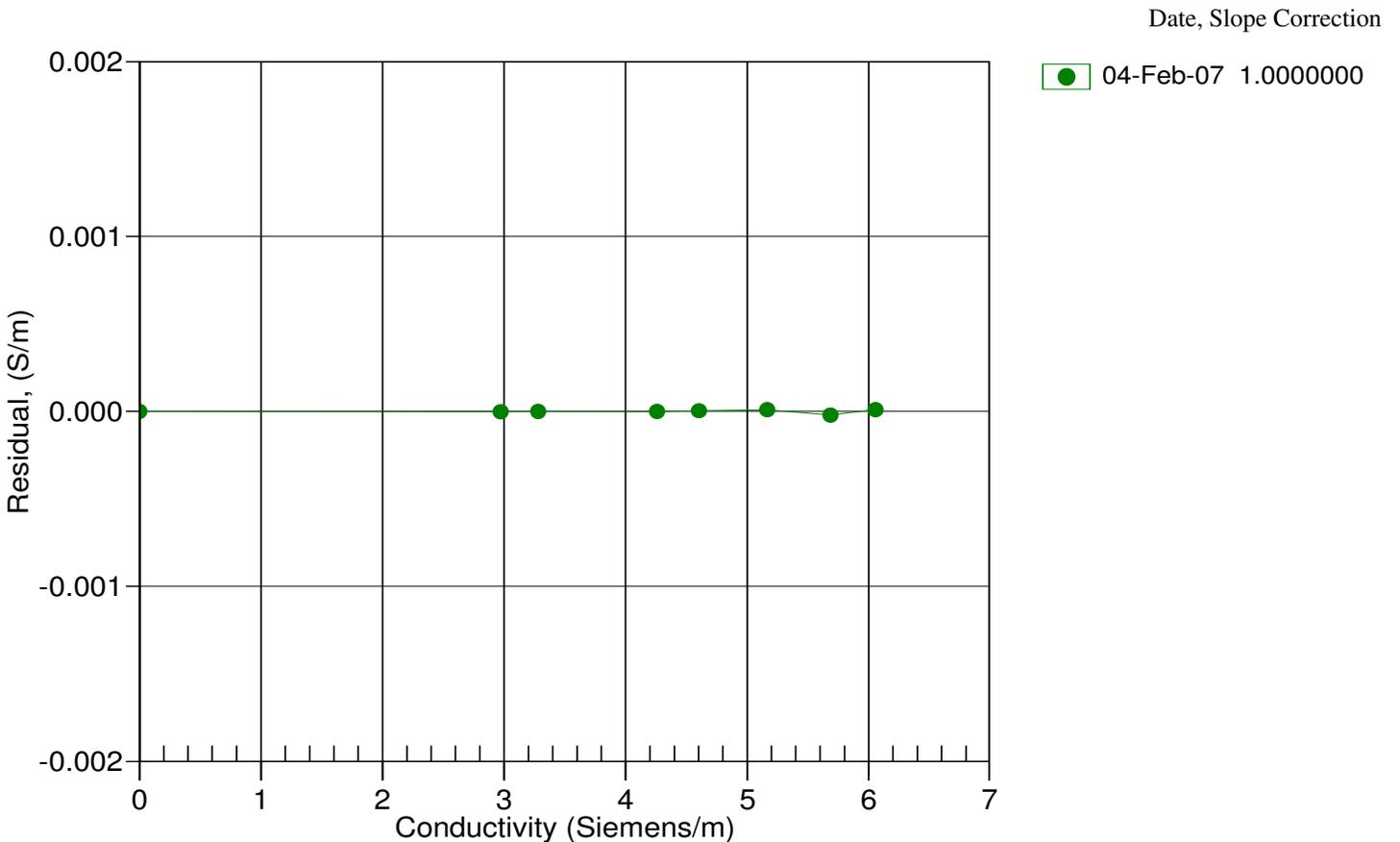
COEFFICIENTS:

g = -9.986027e-001	CPcor = -9.5700e-008
h = 1.534732e-001	CTcor = 3.2500e-006
i = -1.479854e-004	WBOTC = 1.7868e-005
j = 3.780140e-005	

BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2551.41	0.00000	0.00000
0.9999	34.7766	2.97289	5083.23	2.97288	-0.00000
4.5000	34.7571	3.27969	5274.98	3.27969	0.00000
15.0000	34.7151	4.26051	5845.04	4.26051	-0.00000
18.5000	34.7064	4.60536	6032.37	4.60536	0.00000
24.0000	34.6971	5.16285	6323.15	5.16286	0.00001
29.0000	34.6924	5.68431	6583.13	5.68428	-0.00002
32.5000	34.6901	6.05647	6762.39	6.05648	0.00001

$f = \text{INST FREQ} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$
 Conductivity = $(g + hf^2 + if^3 + jf^4) / (1 + \delta t + \epsilon p)$ Siemens/meter
 t = temperature[°C]; p = pressure[decibars]; $\delta = \text{CTcor}$; $\epsilon = \text{CPcor}$;

Residual = instrument conductivity - bath conductivity



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5299
CALIBRATION DATE: 04-Feb-07

SBE 37 RTC CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

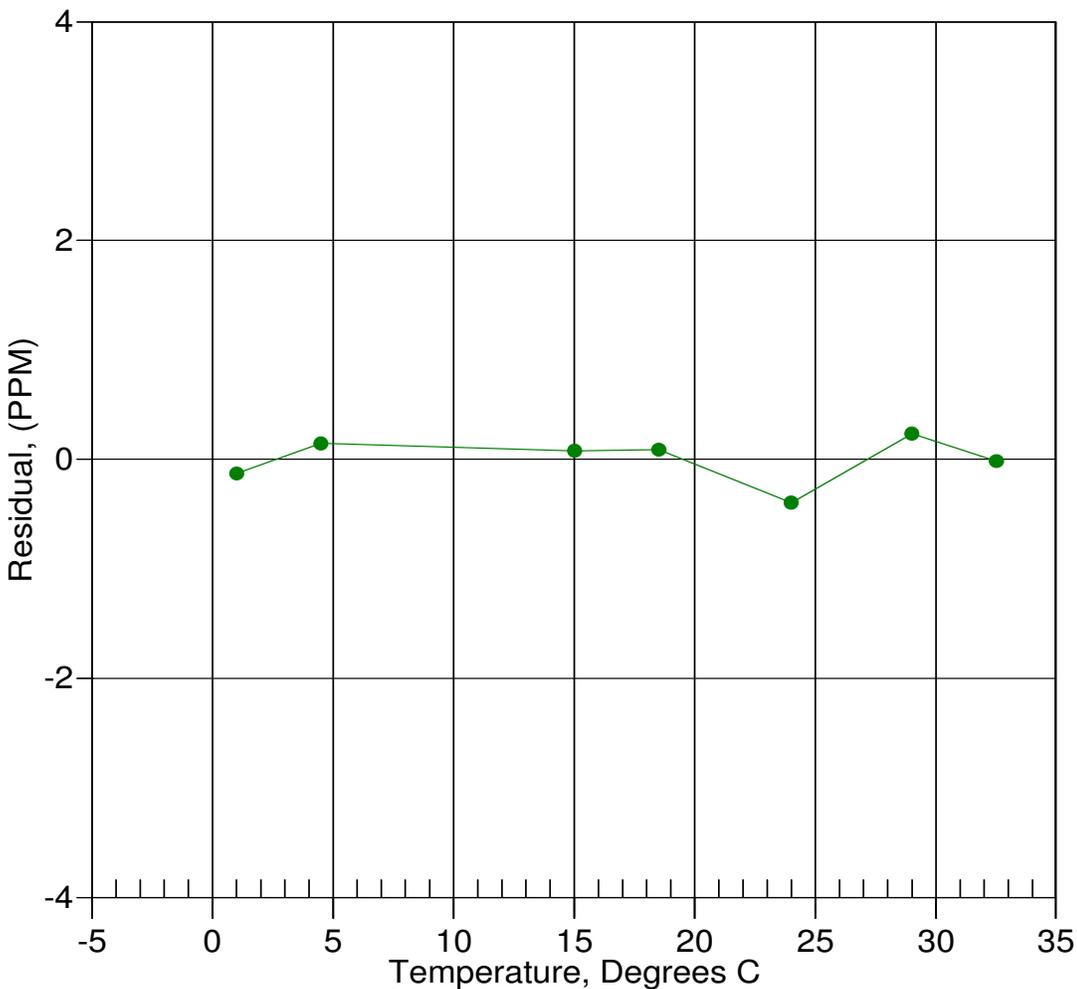
rtca0 = 9.999742e-001
rtca1 = 1.690196e-006
rtca2 = -3.328920e-008

BATH TEMP (ITS-90)	RTC FREQO (Hz)	COMPUTED FREQO (Hz)	RESIDUAL (PPM)
0.9999	0.9999760	0.9999759	-0.1
4.5000	0.9999810	0.9999811	0.1
15.0000	0.9999920	0.9999921	0.1
18.5000	0.9999940	0.9999941	0.1
24.0000	0.9999960	0.9999956	-0.4
29.0000	0.9999950	0.9999952	0.2
32.5000	0.9999940	0.9999940	-0.0

$$\text{RTC frequency} = \text{rtca0} + \text{rtca1} * t + \text{rtca2} * t^2$$

$$\text{Residual} = (\text{Computed RTC frequency} - \text{Measured RTC frequency}) * 1e6$$

Date, Delta F ppm



04-Feb-07 0.00

SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5299
CALIBRATION DATE: 02-Feb-07

SBE 37 PRESSURE CALIBRATION DATA
2900 psia S/N 2385224

COEFFICIENTS:

PA0 = 3.121884e-001
PA1 = 1.377823e-001
PA2 = -4.044029e-008

PTCA0 = 3.067019e+001
PTCA1 = 1.704946e-001
PTCA2 = -2.922677e-003
PTCB0 = 2.603112e+001
PTCB1 = -7.750000e-004
PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	TEMP ITS90	COMPUTED PRESSURE	ERROR %FS
14.75	137.5	20.4	14.73	-0.00
593.14	4338.0	21.0	593.09	-0.00
1170.30	8541.6	21.1	1170.46	0.01
1747.71	12755.3	21.1	1747.77	0.00
2324.97	16979.4	21.2	2325.08	0.00
2902.23	21213.6	21.2	2902.31	0.00
2325.05	16977.6	21.3	2324.83	-0.01
1747.68	12753.0	21.3	1747.47	-0.01
1169.83	8537.9	21.4	1169.96	0.00
592.38	4332.5	21.6	592.34	-0.00
14.74	137.7	21.6	14.75	0.00

THERMAL CORRECTION

TEMP ITS90	INST OUTPUT	TEMP ITS90	SPAN MV
32.50	144.97	-5.00	26.04
29.00	145.25	35.00	26.00
24.00	145.17		
18.50	144.71		
15.00	144.41		
4.50	143.48		
1.00	142.74		

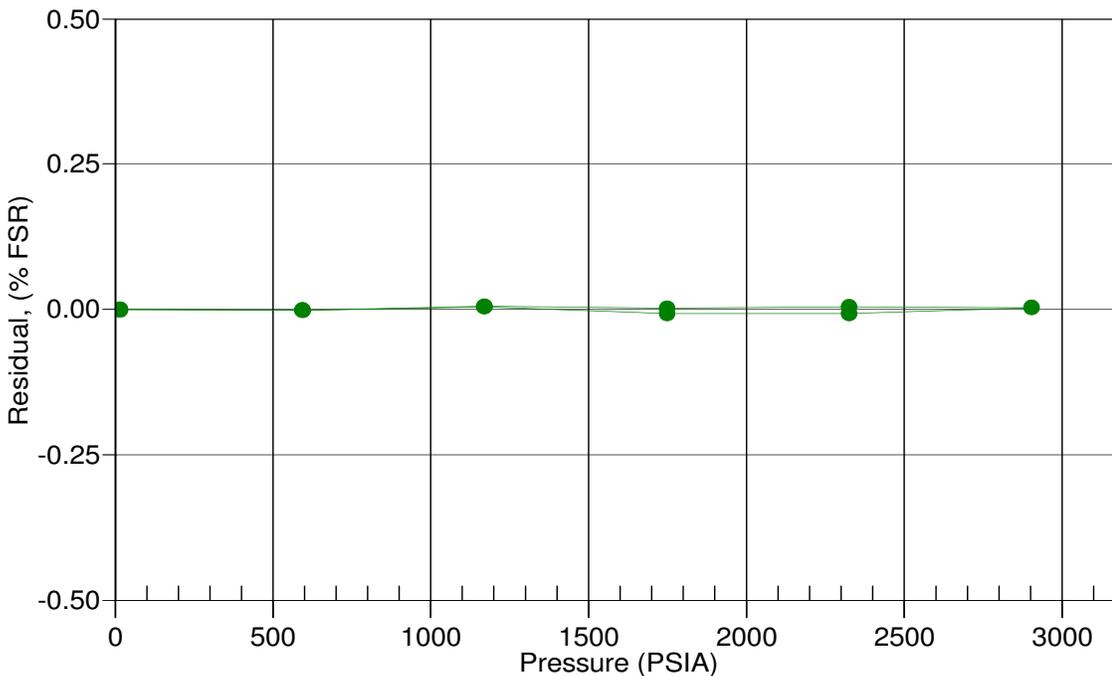
$$x = \text{pressure output} - \text{PTCA0} - \text{PTCA1} * t - \text{PTCA2} * t^2$$

$$n = x * \text{PTCB0} / (\text{PTCB0} + \text{PTCB1} * t + \text{PTCB2} * t^2)$$

$$\text{pressure (psia)} = \text{PA0} + \text{PA1} * n + \text{PA2} * n^2$$

Date, Avg Delta P %FS

● 02-Feb-07 -0.00



SBE37-SMP MicroCAT

*Conductivity & Temperature Recorder
with RS-232 Serial Interface*

Instrument Configuration:

Serial Number	<u>37SMP45526-5300</u>
Pressure Sensor	<u>2000 dBar Druck, SN 2385225</u>
Firmware Version	<u>2.6b</u>
Memory	<u>2048Kb</u>
Interface Type	<u>RS-232</u>
Conductivity Range	<u>0-7 S/m</u>
Pump Sample Rate	<u>0.5 sec</u>
Baud Rate	<u>9600, 8 data bits, no parity</u>
Maximum Depth	<u>2000m</u>

CAUTION - The maximum deployment depth will be limited by the measurement range of the optional pressure sensor, if installed.



Sea-Bird Electronics, Inc.

1808 136th Place NE, Bellevue, Washington 98005 USA

Website: <http://www.seabird.com>

Phone: (425) 643-9866

FAX: (425) 643-9954

Email: seabird@seabird.com

SBE Pressure Test Certificate

Test Date: 2/1/2007 Description SBE-37 Microcat

Job Number: 45526 Customer Name Woods Hole Group

SBE Sensor Information:

Model Number: 37

Serial Number: 5300

Pressure Sensor Information:

Sensor Type: Druck

Sensor Serial Number: 2385225

Sensor Rating: 2900

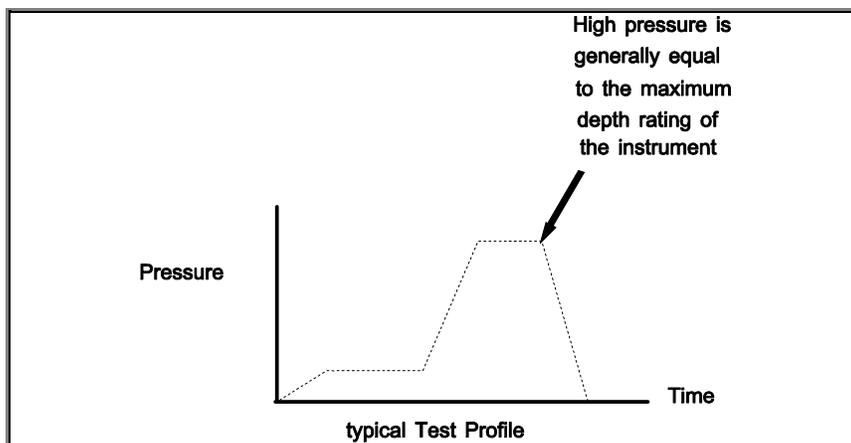
Pressure Test Protocol:

Low Pressure Test: 50 PSI Held For 15 Minutes

High Pressure Test: 2900 PSI Held For 15 Minutes

Passed Test:

Tested By: PCC



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5300
CALIBRATION DATE: 11-Feb-07

SBE 37 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

ITS-90 COEFFICIENTS

a0 = -6.893205e-005

a1 = 2.818084e-004

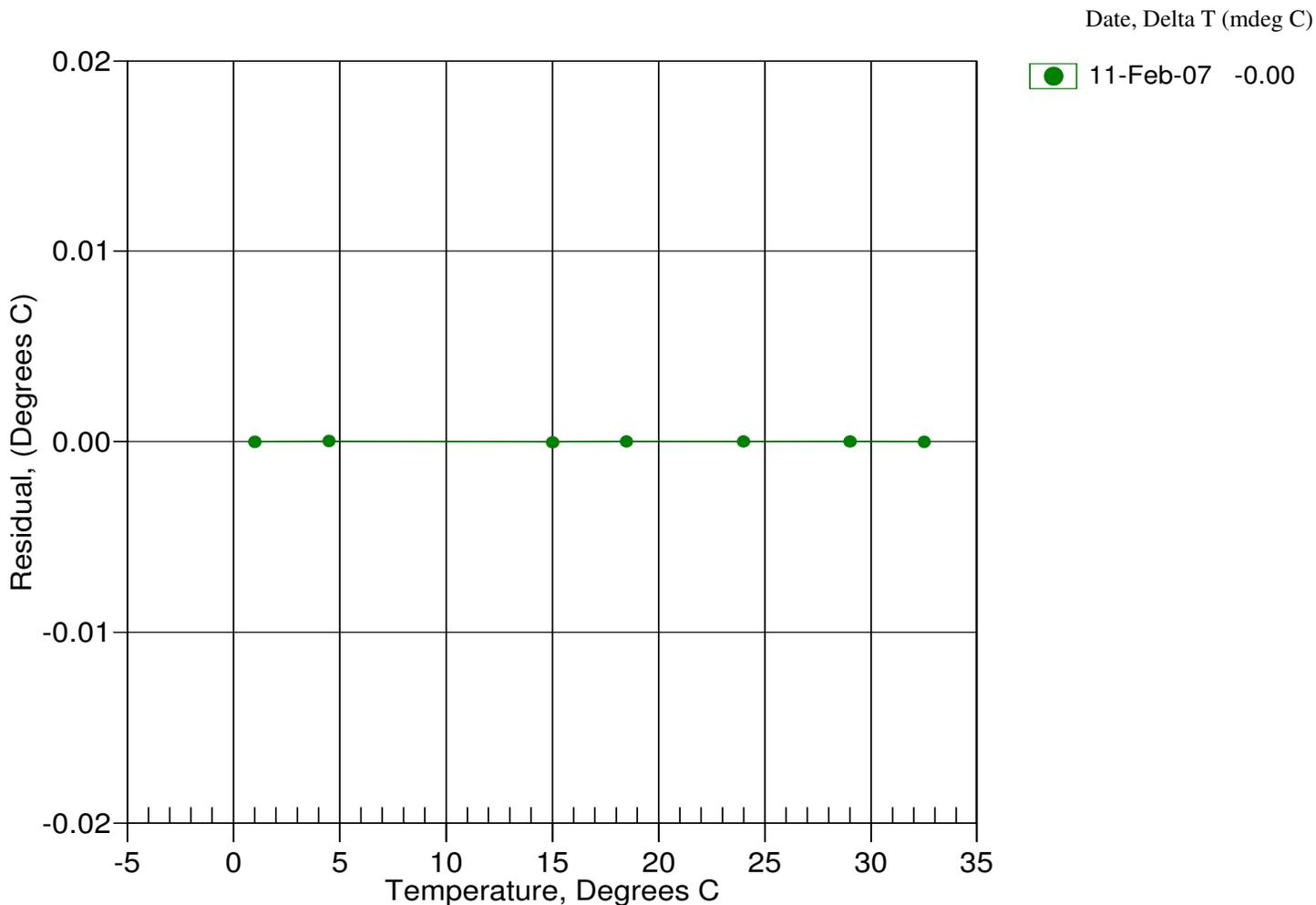
a2 = -2.780426e-006

a3 = 1.635160e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
1.0000	771387.0	0.9999	-0.0000
4.5000	660390.1	4.5000	0.0000
15.0000	422420.6	15.0000	-0.0000
18.5000	366196.1	18.5000	0.0000
24.0000	294290.8	24.0000	0.0000
29.0000	242698.4	29.0000	0.0000
32.5000	212758.7	32.4999	-0.0000

Temperature ITS-90 = $1 / \{ a_0 + a_1[\ln(n)] + a_2[\ln^2(n)] + a_3[\ln^3(n)] \} - 273.15$ (°C)

Residual = instrument temperature - bath temperature



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5300
CALIBRATION DATE: 11-Feb-07

SBE 37 CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

g = -1.001944e+000	CPcor = -9.5700e-008
h = 1.547640e-001	CTcor = 3.2500e-006
i = -4.461292e-005	WBOTC = 2.0449e-005
j = 2.941813e-005	

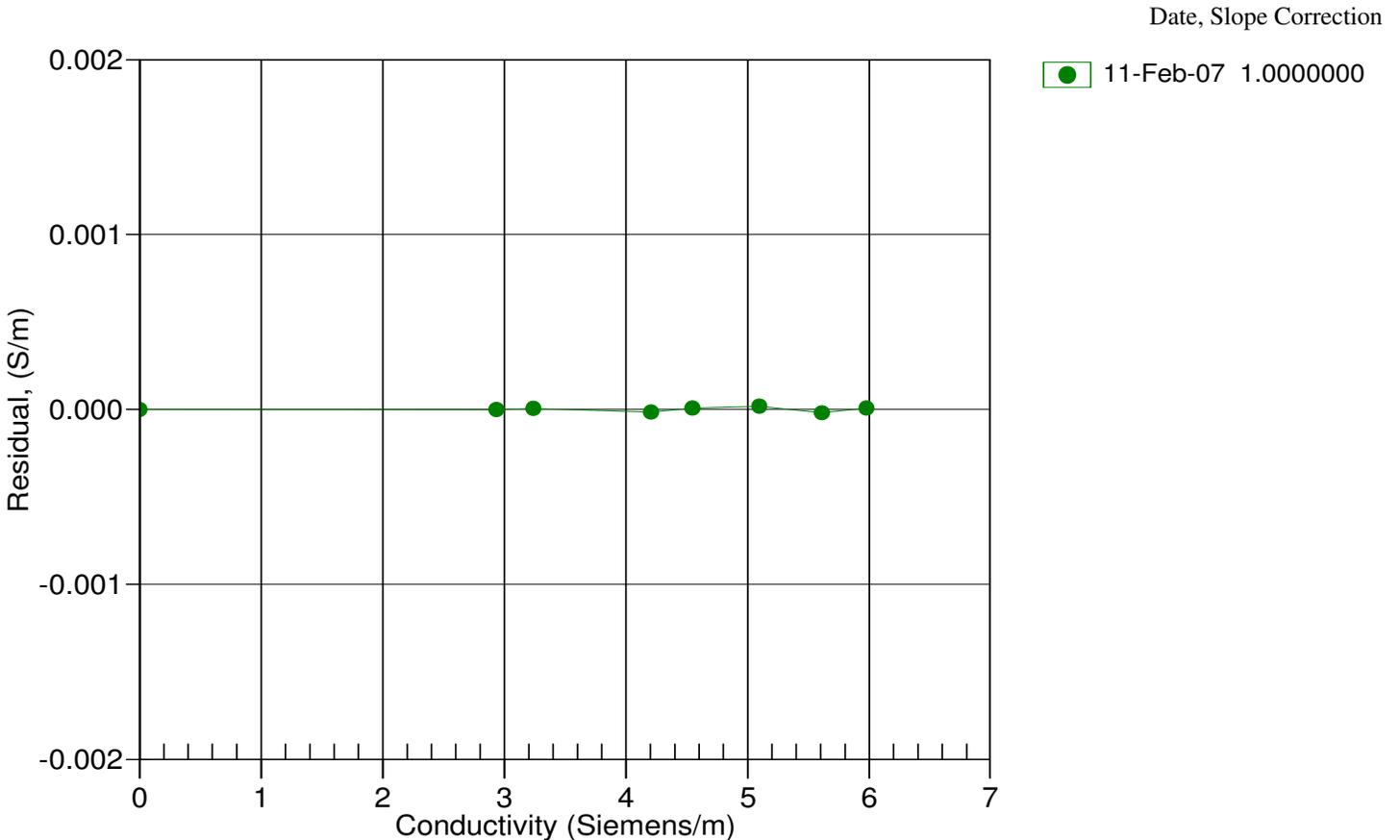
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2543.20	0.00000	0.00000
1.0000	34.2533	2.93238	5033.46	2.93238	-0.00000
4.5000	34.2337	3.23512	5222.55	3.23512	0.00000
15.0000	34.1923	4.20308	5784.96	4.20306	-0.00002
18.5000	34.1832	4.54334	5969.81	4.54335	0.00001
24.0000	34.1735	5.09346	6256.81	5.09348	0.00002
29.0000	34.1677	5.60790	6513.41	5.60788	-0.00002
32.5000	34.1627	5.97475	6690.22	5.97476	0.00001

$$f = \text{INST FREQ} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$$

$$\text{Conductivity} = (g + hf^2 + if^3 + jf^4) / (1 + \delta t + \epsilon p) \text{ Siemens/meter}$$

t = temperature[°C]; p = pressure[decibars]; δ = CTcor; ϵ = CPcor;

Residual = instrument conductivity - bath conductivity



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5300
CALIBRATION DATE: 11-Feb-07

SBE 37 RTC CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

rtca0 = 9.999703e-001
rtca1 = 1.809931e-006
rtca2 = -3.220955e-008

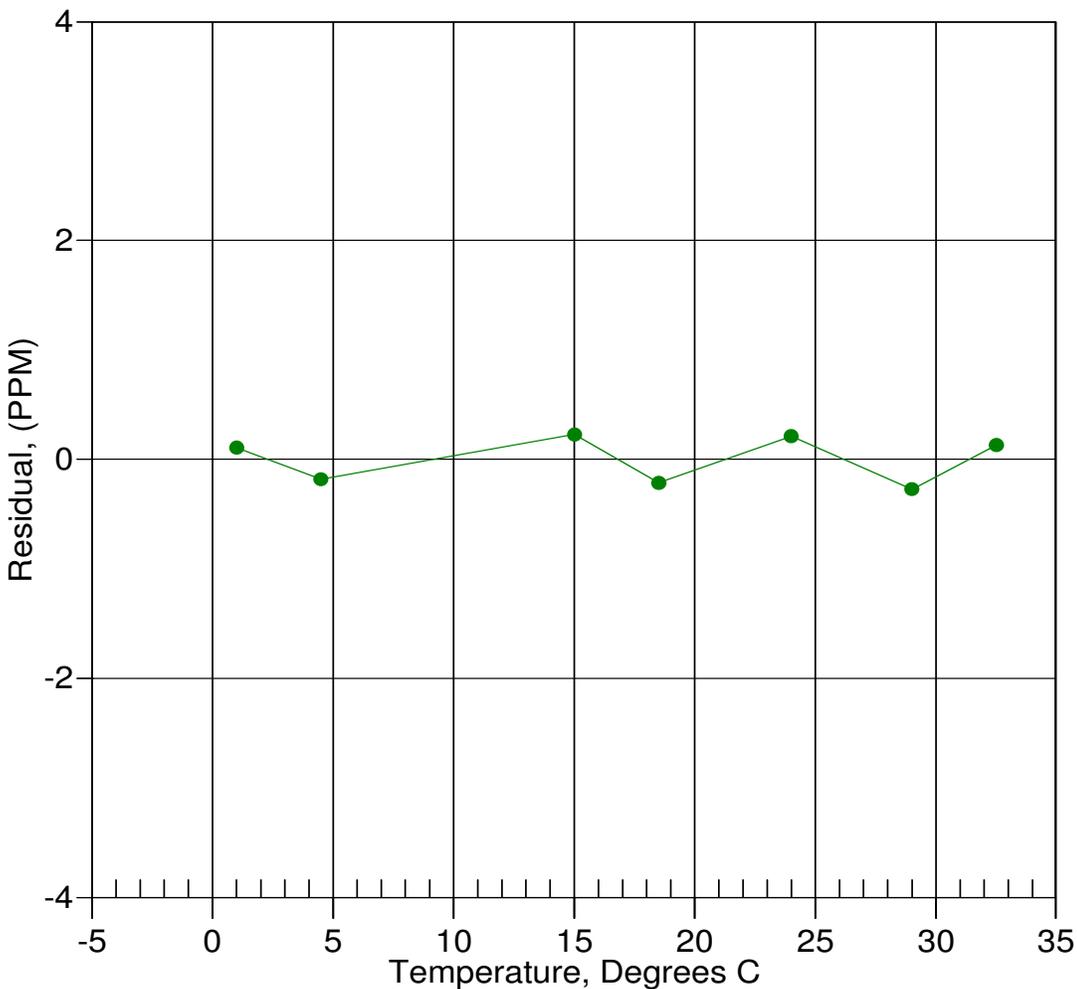
BATH TEMP (ITS-90)	RTC FREQ (Hz)	COMPUTED FREQ (Hz)	RESIDUAL (PPM)
1.0000	0.9999720	0.9999721	0.1
4.5000	0.9999780	0.9999778	-0.2
15.0000	0.9999900	0.9999902	0.2
18.5000	0.9999930	0.9999928	-0.2
24.0000	0.9999950	0.9999952	0.2
29.0000	0.9999960	0.9999957	-0.3
32.5000	0.9999950	0.9999951	0.1

$$\text{RTC frequency} = \text{rtca0} + \text{rtca1} * t + \text{rtca2} * t^2$$

$$\text{Residual} = (\text{Computed RTC frequency} - \text{Measured RTC frequency}) * 1e6$$

Date, Delta F ppm

11-Feb-07 0.00



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5300
CALIBRATION DATE: 02-Feb-07

SBE 37 PRESSURE CALIBRATION DATA
2900 psia S/N 2385225

COEFFICIENTS:

PA0 = 1.271508e-001
PA1 = 1.386125e-001
PA2 = -4.135645e-008

PTCA0 = 5.342022e+001
PTCA1 = 1.230763e-001
PTCA2 = -3.820075e-003
PTCB0 = 2.601275e+001
PTCB1 = 1.150000e-003
PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	TEMP ITS90	COMPUTED PRESSURE	ERROR %FS
14.75	159.8	20.4	14.73	-0.00
593.14	4341.4	21.0	593.06	-0.00
1170.30	8526.7	21.1	1170.45	0.00
1747.71	12722.1	21.1	1747.78	0.00
2324.97	16927.9	21.2	2325.07	0.00
2902.23	21144.1	21.2	2902.33	0.00
2325.05	16926.0	21.3	2324.81	-0.01
1747.68	12719.7	21.3	1747.44	-0.01
1169.83	8523.8	21.4	1170.03	0.01
592.38	4336.4	21.6	592.36	-0.00
14.74	159.8	21.6	14.74	-0.00

THERMAL CORRECTION

TEMP ITS90	INST OUTPUT	TEMP ITS90	SPAN MV
32.50	162.91	-5.00	26.01
29.00	163.53	35.00	26.05
24.00	163.96		
18.50	163.95		
15.00	163.90		
4.50	163.70		
1.00	163.10		

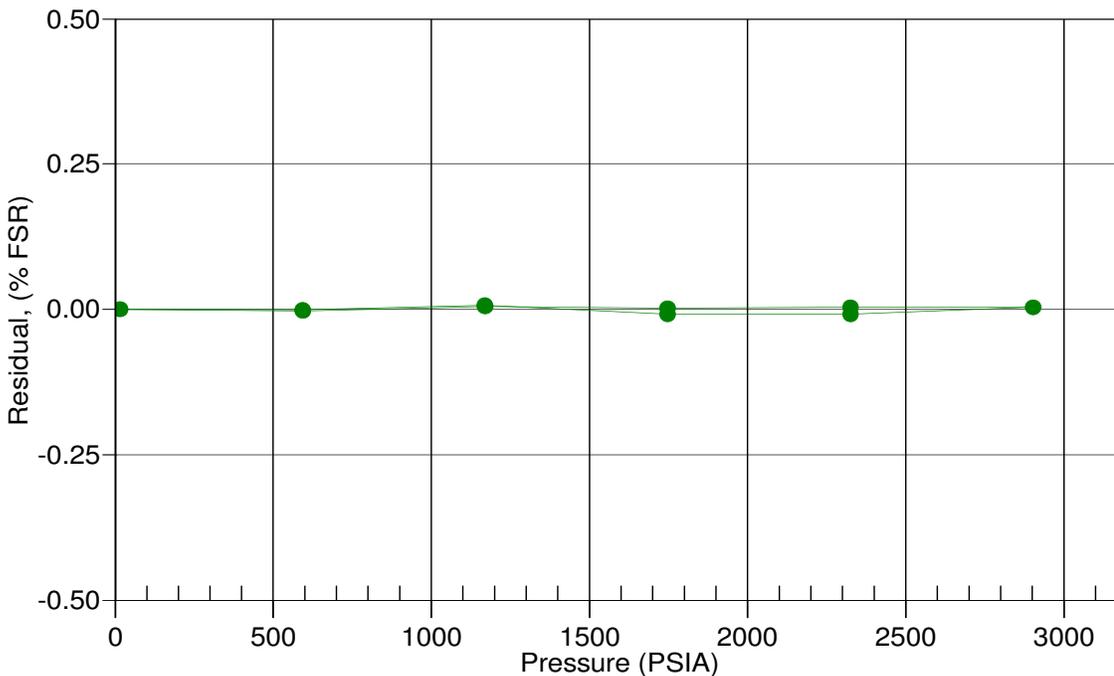
$$x = \text{pressure output} - \text{PTCA0} - \text{PTCA1} * t - \text{PTCA2} * t^2$$

$$n = x * \text{PTCB0} / (\text{PTCB0} + \text{PTCB1} * t + \text{PTCB2} * t^2)$$

$$\text{pressure (psia)} = \text{PA0} + \text{PA1} * n + \text{PA2} * n^2$$

Date, Avg Delta P %FS

02-Feb-07 0.00



SBE37-SMP MicroCAT

*Conductivity & Temperature Recorder
with RS-232 Serial Interface*

Instrument Configuration:

Serial Number	37SMP45526-5301
Pressure Sensor	2000 dBar Druck, SN 2385226
Firmware Version	2.6b
Memory	2048Kb
Interface Type	RS-232
Conductivity Range	0-7 S/m
Pump Sample Rate	0.5 sec
Baud Rate	9600, 8 data bits, no parity
Maximum Depth	2000m

CAUTION - The maximum deployment depth will be limited by the measurement range of the optional pressure sensor, if installed.



Sea-Bird Electronics, Inc.

1808 136th Place NE, Bellevue, Washington 98005 USA

Website: <http://www.seabird.com>

Phone: (425) 643-9866

FAX: (425) 643-9954

Email: seabird@seabird.com

SBE Pressure Test Certificate

Test Date: 2/1/2007 Description SBE-37 Microcat

Job Number: 45526 Customer Name Woods Hole Group

SBE Sensor Information:

Model Number: 37

Serial Number: 5301

Pressure Sensor Information:

Sensor Type: Druck

Sensor Serial Number: 2385226

Sensor Rating: 2900

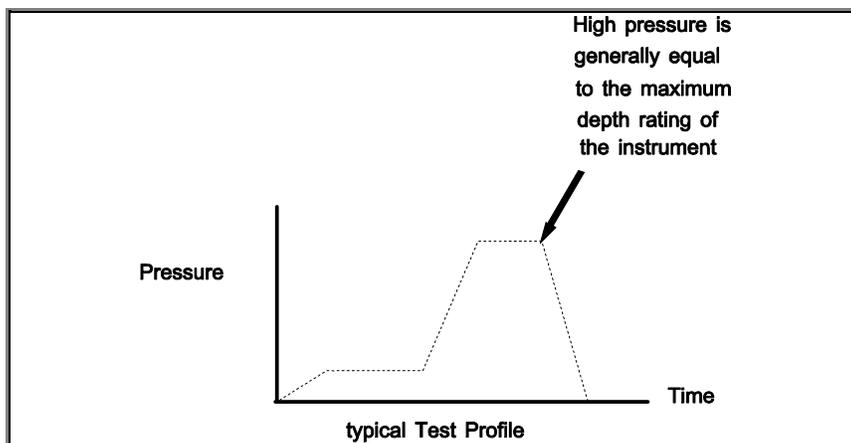
Pressure Test Protocol:

Low Pressure Test: 50 PSI Held For 15 Minutes

High Pressure Test: 2900 PSI Held For 15 Minutes

Passed Test:

Tested By: PCC



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5301
CALIBRATION DATE: 04-Feb-07

SBE 37 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

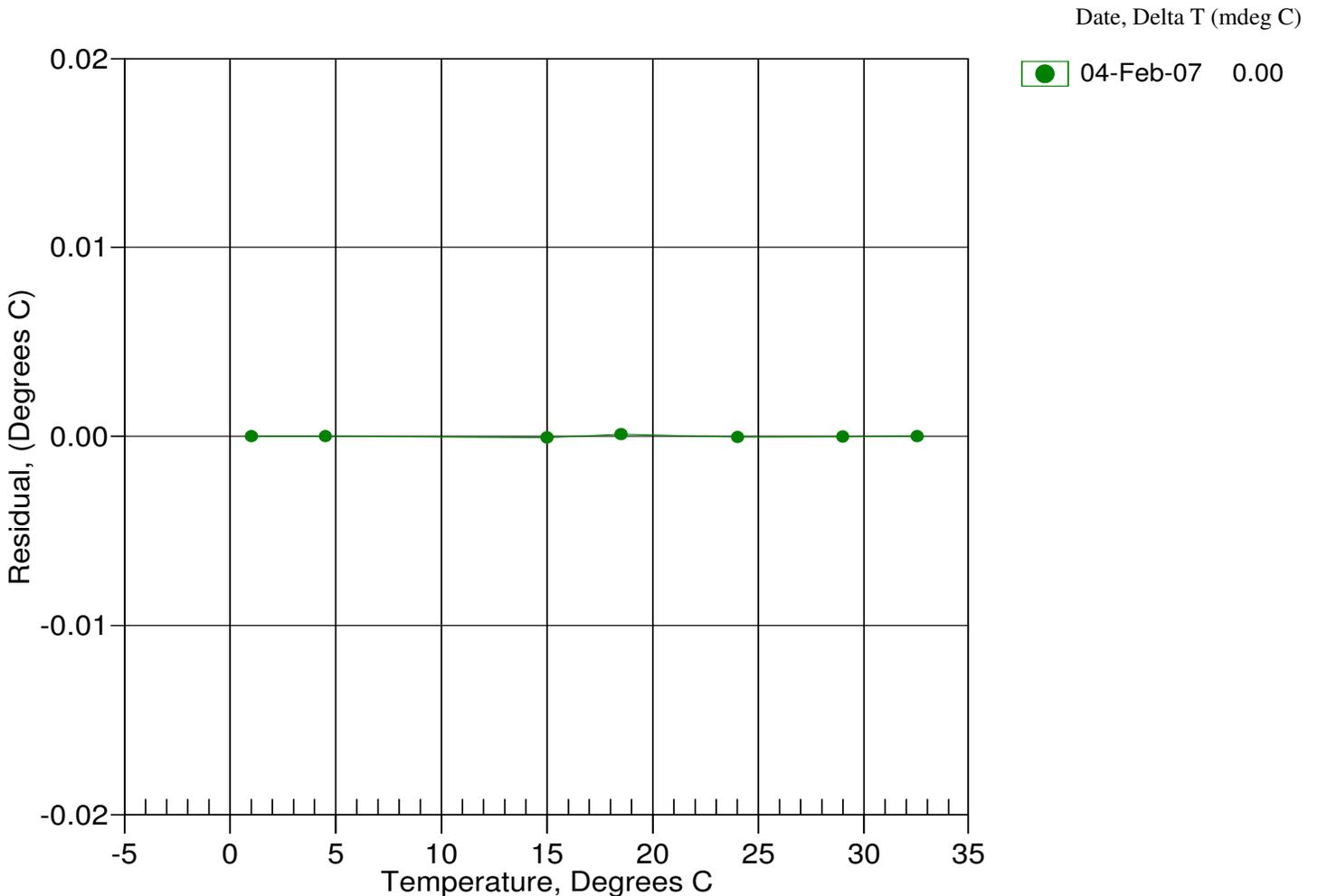
ITS-90 COEFFICIENTS

a0 = -5.024051e-006
a1 = 2.654357e-004
a2 = -1.573967e-006
a3 = 1.298724e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
0.9999	825980.9	0.9999	0.0000
4.5000	706498.6	4.5000	0.0000
15.0000	450788.8	14.9999	-0.0001
18.5000	390479.2	18.5001	0.0001
24.0000	313433.4	24.0000	-0.0000
29.0000	258212.9	29.0000	-0.0000
32.5000	226195.6	32.5000	0.0000

Temperature ITS-90 = $1 / \{ a_0 + a_1[\ln(n)] + a_2[\ln^2(n)] + a_3[\ln^3(n)] \} - 273.15$ (°C)

Residual = instrument temperature - bath temperature



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5301
CALIBRATION DATE: 04-Feb-07

SBE 37 CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

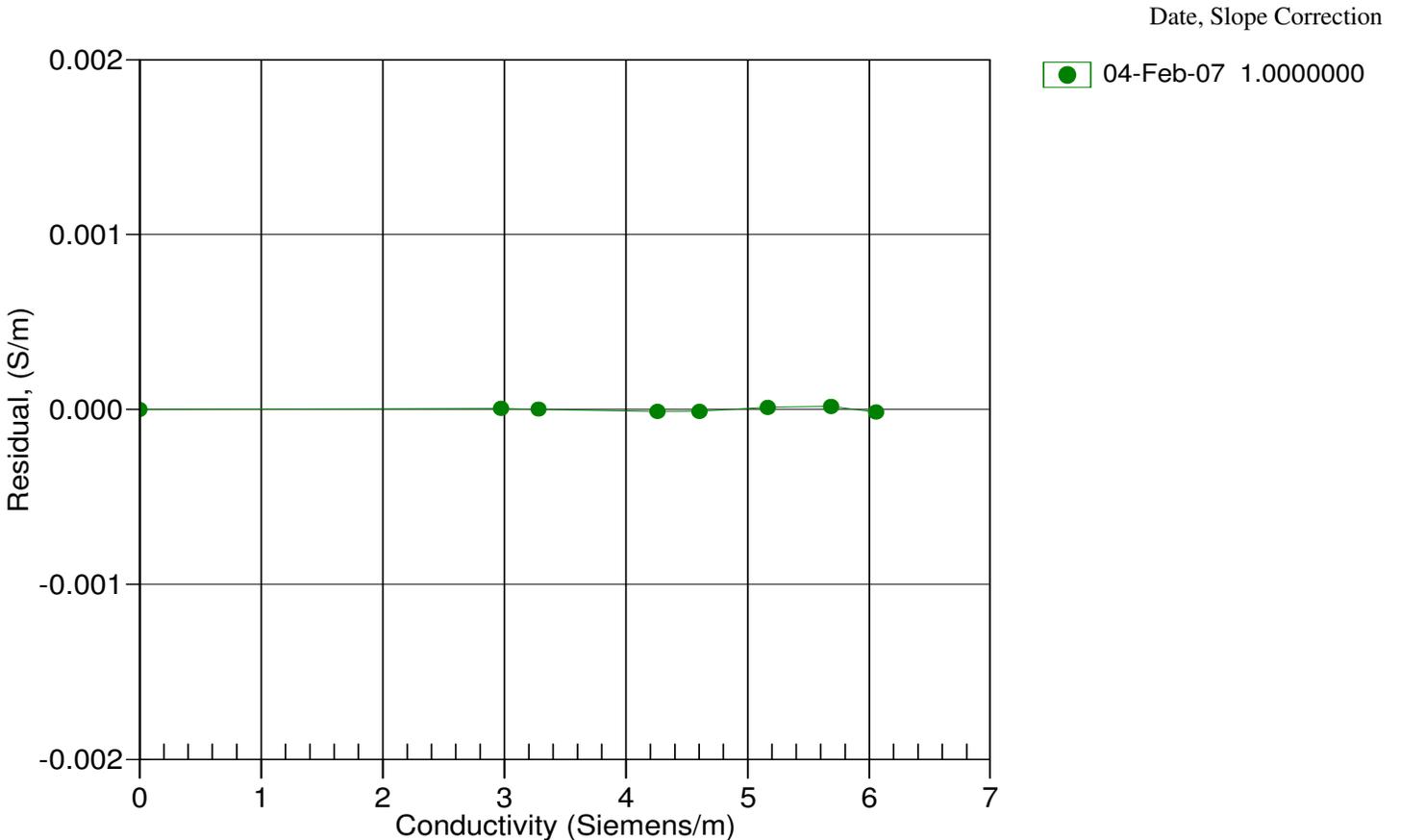
COEFFICIENTS:

g = -9.947474e-001	CPcor = -9.5700e-008
h = 1.551722e-001	CTcor = 3.2500e-006
i = -2.115604e-004	WBOTC = 1.9574e-005
j = 4.379294e-005	

BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2533.45	0.00000	0.00000
0.9999	34.7766	2.97289	5055.75	2.97289	0.00000
4.5000	34.7571	3.27969	5246.65	3.27969	0.00000
15.0000	34.7151	4.26051	5814.12	4.26050	-0.00001
18.5000	34.7064	4.60536	6000.57	4.60535	-0.00001
24.0000	34.6971	5.16285	6289.98	5.16286	0.00001
29.0000	34.6924	5.68431	6548.71	5.68432	0.00002
32.5000	34.6901	6.05647	6727.05	6.05645	-0.00002

$f = \text{INST FREQ} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$
 Conductivity = $(g + hf^2 + if^3 + jf^4) / (1 + \delta t + \epsilon p)$ Siemens/meter
 t = temperature[°C]; p = pressure[decibars]; $\delta = \text{CTcor}$; $\epsilon = \text{CPcor}$;

Residual = instrument conductivity - bath conductivity



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5301
CALIBRATION DATE: 04-Feb-07

SBE 37 RTC CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

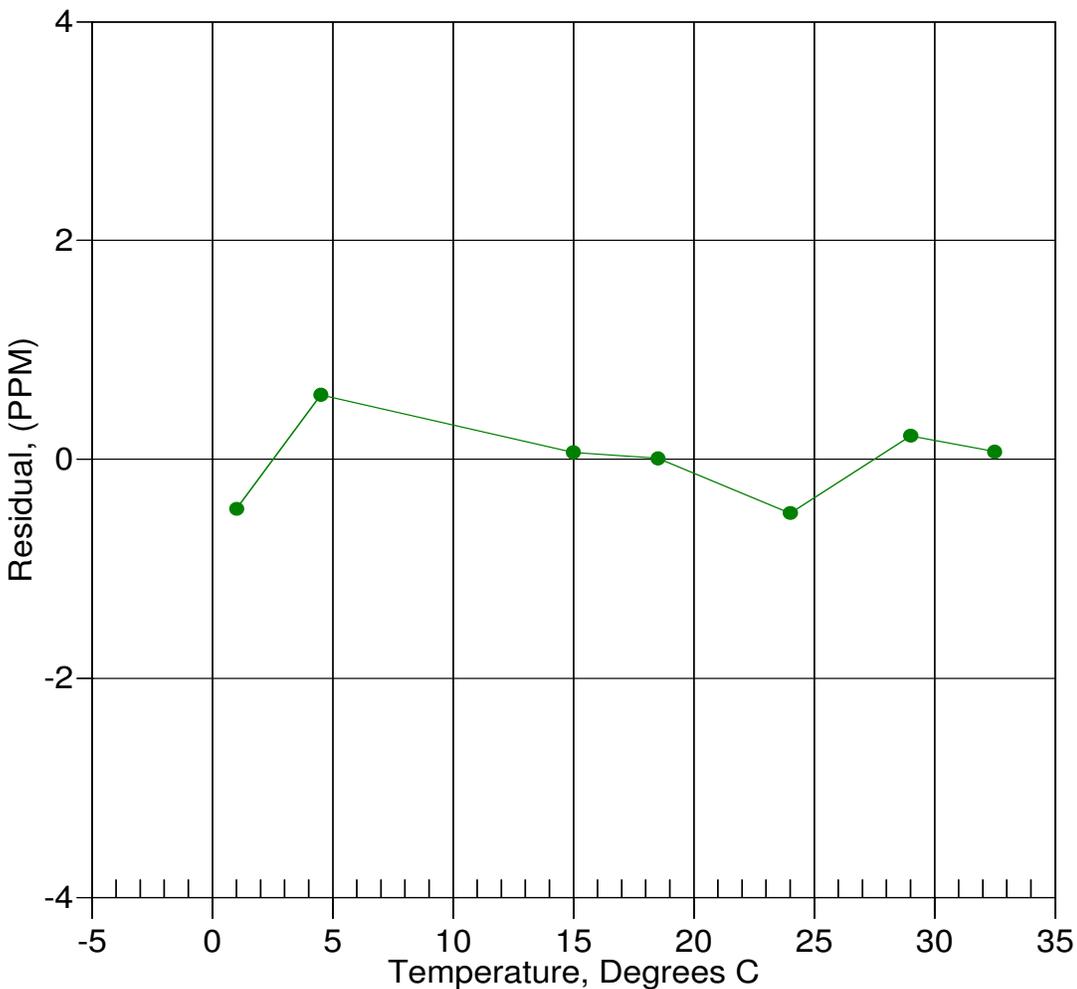
rtca0 = 1.000004e+000
rtca1 = 1.612737e-006
rtca2 = -3.153713e-008

BATH TEMP (ITS-90)	RTC FREQ (Hz)	COMPUTED FREQ (Hz)	RESIDUAL (PPM)
0.9999	1.0000060	1.0000055	-0.5
4.5000	1.0000100	1.0000106	0.6
15.0000	1.0000210	1.0000211	0.1
18.5000	1.0000230	1.0000230	0.0
24.0000	1.0000250	1.0000245	-0.5
29.0000	1.0000240	1.0000242	0.2
32.5000	1.0000230	1.0000231	0.1

$$\text{RTC frequency} = \text{rtca0} + \text{rtca1} * t + \text{rtca2} * t^2$$

$$\text{Residual} = (\text{Computed RTC frequency} - \text{Measured RTC frequency}) * 1e6$$

Date, Delta F ppm



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5301
CALIBRATION DATE: 02-Feb-07

SBE 37 PRESSURE CALIBRATION DATA
2900 psia S/N 2385226

COEFFICIENTS:

PA0 = 4.107069e-002
PA1 = 1.384695e-001
PA2 = -3.971489e-008

PTCA0 = 6.513926e+000
PTCA1 = 1.112714e-001
PTCA2 = -4.451189e-003
PTCB0 = 2.597300e+001
PTCB1 = 1.200000e-003
PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	TEMP ITS90	COMPUTED PRESSURE	ERROR %FS
14.74	113.1	22.0	14.74	0.00
592.11	4291.9	22.1	592.06	-0.00
1169.47	8481.4	22.1	1169.47	0.00
1746.66	12679.7	22.1	1746.70	0.00
2323.82	16887.8	22.1	2323.87	0.00
2901.00	21105.6	22.1	2900.96	-0.00
2323.61	16886.1	22.1	2323.63	0.00
1746.60	12678.8	22.1	1746.57	-0.00
1169.08	8478.3	22.1	1169.04	-0.00
591.60	4288.5	22.3	591.59	-0.00
14.73	113.2	22.4	14.76	0.00

THERMAL CORRECTION

TEMP ITS90	INST OUTPUT	TEMP ITS90	SPAN MV
32.50	118.72	-5.00	25.97
29.00	119.58	35.00	26.02
24.00	120.24		
18.50	120.41		
15.00	120.45		
4.50	120.50		
1.00	120.01		

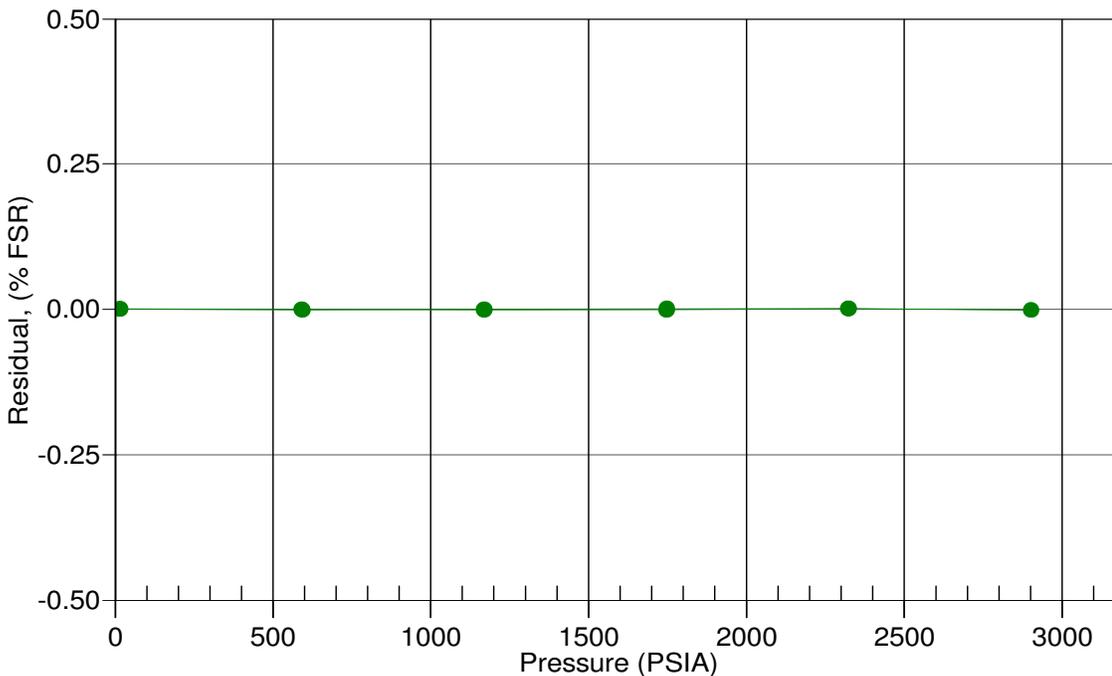
$$x = \text{pressure output} - \text{PTCA0} - \text{PTCA1} * t - \text{PTCA2} * t^2$$

$$n = x * \text{PTCB0} / (\text{PTCB0} + \text{PTCB1} * t + \text{PTCB2} * t^2)$$

$$\text{pressure (psia)} = \text{PA0} + \text{PA1} * n + \text{PA2} * n^2$$

Date, Avg Delta P %FS

● 02-Feb-07 -0.00



SBE37-SMP MicroCAT

*Conductivity & Temperature Recorder
with RS-232 Serial Interface*

Instrument Configuration:

Serial Number	37SMP45526-5302
Pressure Sensor	2000 dBar Druck, SN 2385228
Firmware Version	2.6b
Memory	2048Kb
Interface Type	RS-232
Conductivity Range	0-7 S/m
Pump Sample Rate	0.5 sec
Baud Rate	9600, 8 data bits, no parity
Maximum Depth	2000m

CAUTION - The maximum deployment depth will be limited by the measurement range of the optional pressure sensor, if installed.



Sea-Bird Electronics, Inc.

1808 136th Place NE, Bellevue, Washington 98005 USA
Website: <http://www.seabird.com>

Phone: (425) 643-9866
FAX: (425) 643-9954
Email: seabird@seabird.com

SBE Pressure Test Certificate

Test Date: 2/1/2007 Description SBE-37 Microcat

Job Number: 45526 Customer Name Woods Hole Group

SBE Sensor Information:

Model Number: 37
Serial Number: 5302

Pressure Sensor Information:

Sensor Type: Druck
Sensor Serial Number: 2385228
Sensor Rating: 2900

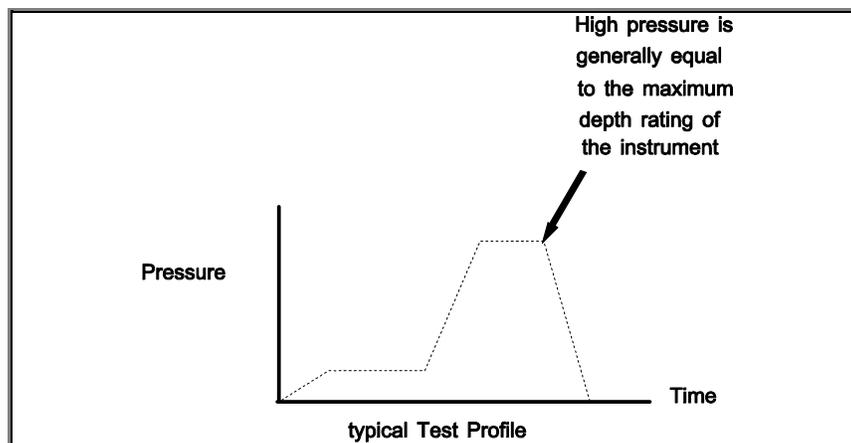
Pressure Test Protocol:

Low Pressure Test: 50 PSI Held For 15 Minutes

High Pressure Test: 2900 PSI Held For 15 Minutes

Passed Test:

Tested By: PCC



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5302
CALIBRATION DATE: 04-Feb-07

SBE 37 TEMPERATURE CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

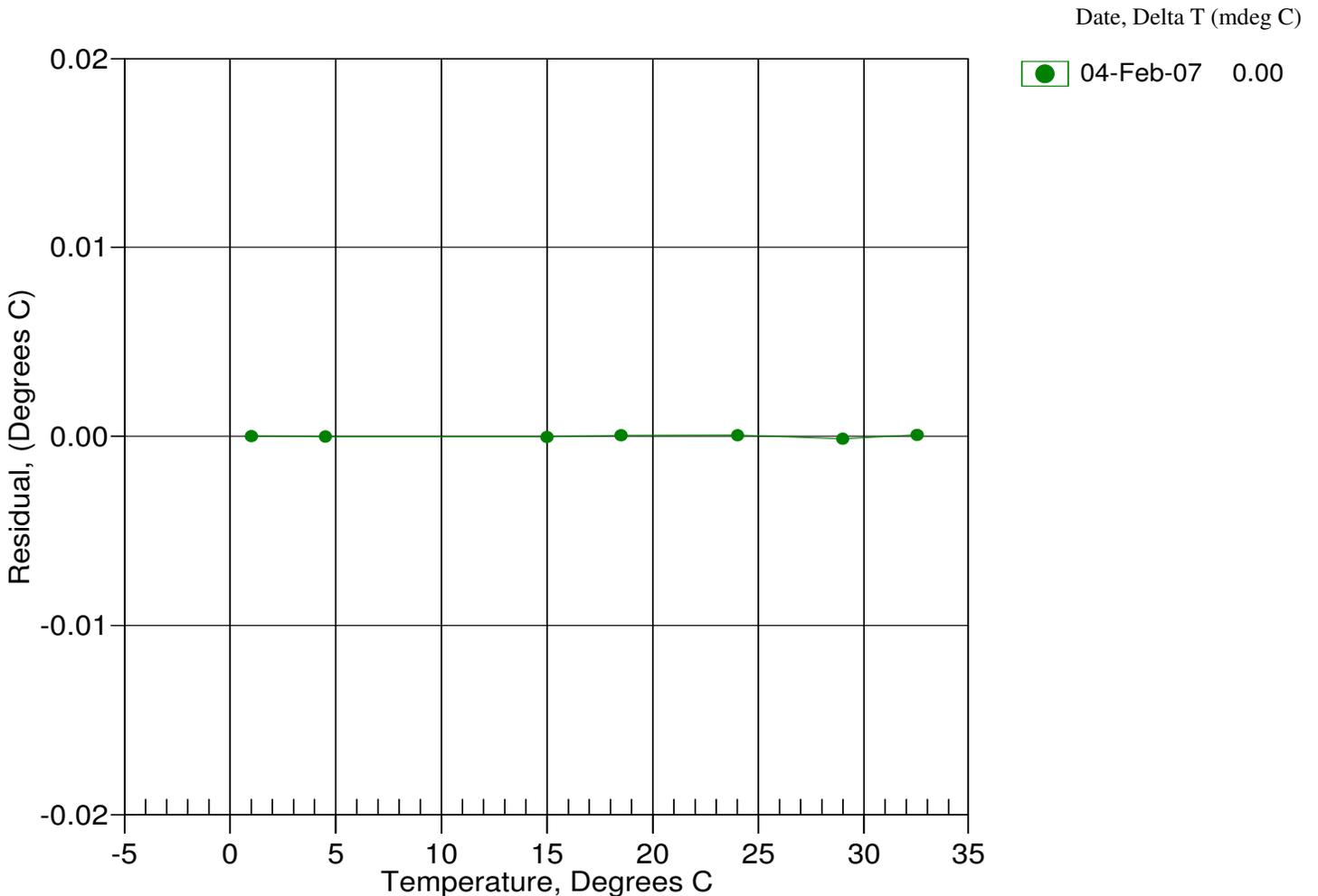
ITS-90 COEFFICIENTS

a0 = 1.247816e-005
a1 = 2.663090e-004
a2 = -1.623708e-006
a3 = 1.327885e-007

BATH TEMP (ITS-90)	INSTRUMENT OUTPUT	INST TEMP (ITS-90)	RESIDUAL (ITS-90)
0.9999	752509.6	0.9999	0.0000
4.5000	643804.1	4.5000	-0.0000
15.0000	411048.1	15.0000	-0.0000
18.5000	356127.9	18.5000	0.0000
24.0000	285944.3	24.0001	0.0001
29.0000	235630.3	28.9999	-0.0001
32.5000	206448.1	32.5001	0.0001

Temperature ITS-90 = $1 / \{ a_0 + a_1[\ln(n)] + a_2[\ln^2(n)] + a_3[\ln^3(n)] \} - 273.15$ (°C)

Residual = instrument temperature - bath temperature



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5302
CALIBRATION DATE: 04-Feb-07

SBE 37 CONDUCTIVITY CALIBRATION DATA
PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

COEFFICIENTS:

g = -9.841250e-001	CPcor = -9.5700e-008
h = 1.515867e-001	CTcor = 3.2500e-006
i = -1.536081e-004	WBOTC = 2.1192e-005
j = 3.830028e-005	

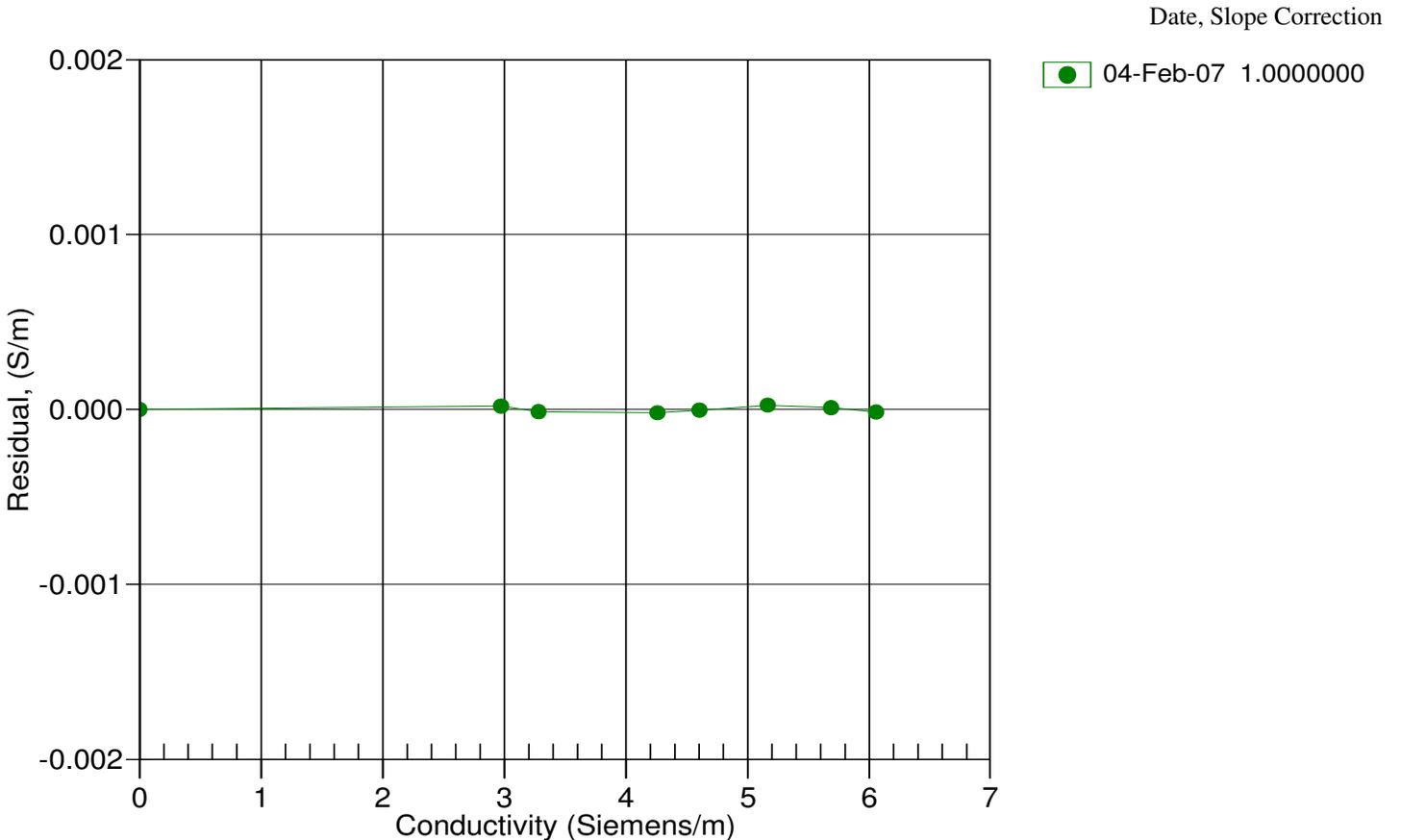
BATH TEMP (ITS-90)	BATH SAL (PSU)	BATH COND (Siemens/m)	INST FREQ (Hz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
22.0000	0.0000	0.00000	2548.58	0.00000	0.00000
0.9999	34.7766	2.97289	5105.56	2.97291	0.00002
4.5000	34.7571	3.27969	5298.77	3.27967	-0.00001
15.0000	34.7151	4.26051	5873.08	4.26049	-0.00002
18.5000	34.7064	4.60536	6061.77	4.60536	-0.00000
24.0000	34.6971	5.16285	6354.60	5.16287	0.00002
29.0000	34.6924	5.68431	6616.39	5.68432	0.00001
32.5000	34.6901	6.05647	6796.82	6.05645	-0.00002

$$f = \text{INST FREQ} * \text{sqrt}(1.0 + \text{WBOTC} * t) / 1000.0$$

$$\text{Conductivity} = (g + hf^2 + if^3 + jf^4) / (1 + \delta t + \epsilon p) \text{ Siemens/meter}$$

t = temperature[°C]; p = pressure[decibars]; δ = CTcor; ϵ = CPcor;

Residual = instrument conductivity - bath conductivity



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5302
CALIBRATION DATE: 04-Feb-07

SBE 37 RTC CALIBRATION DATA
ITS-90 TEMPERATURE SCALE

COEFFICIENTS:

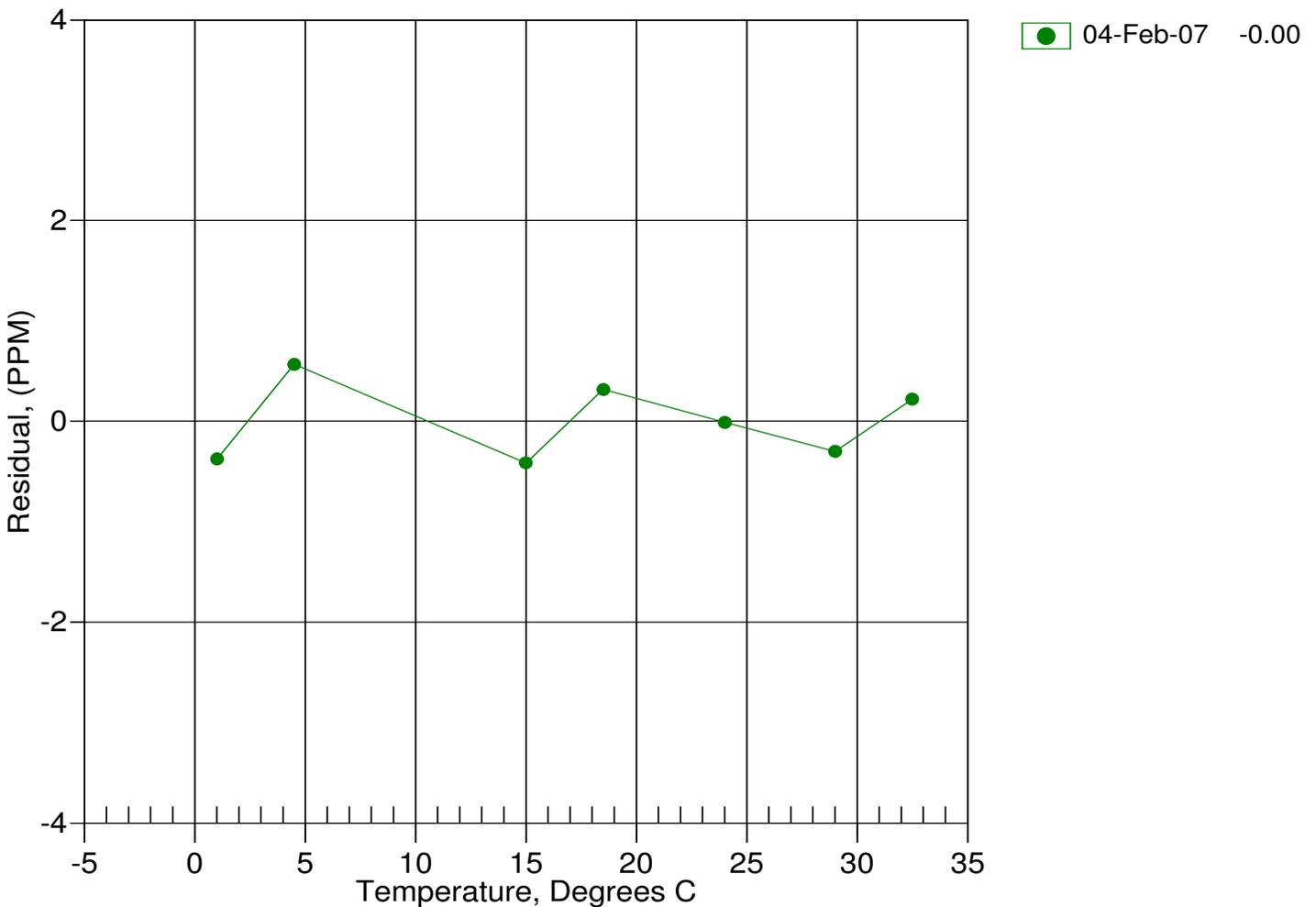
rtca0 = 9.999748e-001
rtca1 = 1.878806e-006
rtca2 = -3.277350e-008

BATH TEMP (ITS-90)	RTC FREQO (Hz)	COMPUTED FREQO (Hz)	RESIDUAL (PPM)
0.9999	0.9999770	0.9999766	-0.4
4.5000	0.9999820	0.9999826	0.6
15.0000	0.9999960	0.9999956	-0.4
18.5000	0.9999980	0.9999983	0.3
24.0000	1.0000010	1.0000010	-0.0
29.0000	1.0000020	1.0000017	-0.3
32.5000	1.0000010	1.0000012	0.2

$$\text{RTC frequency} = \text{rtca0} + \text{rtca1} * t + \text{rtca2} * t^2$$

$$\text{Residual} = (\text{Computed RTC frequency} - \text{Measured RTC frequency}) * 1e6$$

Date, Delta F ppm



SEA-BIRD ELECTRONICS, INC.

1808 136th Place N.E., Bellevue, Washington, 98005 USA

Phone: (425) 643 - 9866 Fax (425) 643 - 9954 Email: seabird@seabird.com

SENSOR SERIAL NUMBER: 5302
CALIBRATION DATE: 02-Feb-07

SBE 37 PRESSURE CALIBRATION DATA
2900 psia S/N 2385228

COEFFICIENTS:

PA0 = 2.488840e-003
PA1 = 1.381497e-001
PA2 = -4.034755e-008

PTCA0 = -1.685167e+000
PTCA1 = 3.371499e-002
PTCA2 = -1.497929e-003
PTCB0 = 2.600500e+001
PTCB1 = 2.000000e-003
PTCB2 = 0.000000e+000

PRESSURE SPAN CALIBRATION

PRESSURE PSIA	INST OUTPUT	TEMP ITS90	COMPUTED PRESSURE	ERROR %FS
14.74	105.2	22.0	14.74	0.00
592.11	4296.7	22.1	592.07	-0.00
1169.47	8499.1	22.1	1169.49	0.00
1746.66	12710.5	22.1	1746.71	0.00
2323.82	16931.9	22.1	2323.87	0.00
2901.00	21163.3	22.1	2900.97	-0.00
2323.61	16930.1	22.1	2323.63	0.00
1746.60	12709.3	22.1	1746.54	-0.00
1169.08	8495.9	22.1	1169.04	-0.00
591.60	4293.3	22.3	591.60	0.00
14.73	105.3	22.4	14.76	0.00

THERMAL CORRECTION

TEMP ITS90	INST OUTPUT	TEMP ITS90	SPAN MV
32.50	111.89	-5.00	26.00
29.00	112.37	35.00	26.07
24.00	112.63		
18.50	112.55		
15.00	112.52		
4.50	112.78		
1.00	112.49		

$$x = \text{pressure output} - \text{PTCA0} - \text{PTCA1} * t - \text{PTCA2} * t^2$$

$$n = x * \text{PTCB0} / (\text{PTCB0} + \text{PTCB1} * t + \text{PTCB2} * t^2)$$

$$\text{pressure (psia)} = \text{PA0} + \text{PA1} * n + \text{PA2} * n^2$$

Date, Avg Delta P %FS

● 02-Feb-07 -0.00

